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What are the reasons for replacing obsolete equipment?
How soon should new equipment pay for itself?
What are the steps taken in buying equipment?
Is group or individual motor drive preferable?
Is a repair cost record worth while?
How are obsolete machines disposed of?
What are the faults of machine tools?
How keep informed of developments in equipment?

Conclusive answers to these questions are of extreme importance to the user of shop equipment. The answers have been given in the *American Machinist* in its series of articles, "Getting the Most Out of Your Machine Tool Dollar." But not all of the leaders of the machinery industries think alike on such subjects and the problems are likely to require different answers in different plants. Therefore cross-sections are presented here of the articles as a whole, the statements of company policies being quoted or abstracted, as they apply to the several questions.

In this article, the FOURTH *of a series of eight, answers are given to the question*

Is Group or Individual Motor Drive Preferable?

Illinois Central—The ability to obtain individual motor drive on modern machine tools influences the Illinois Central Railroad to make replacements. The characteristics of individual motor drive that cause its adoption are the "tremendous advantages in case of break-down on transmission lines or when one machine only is to be operated, for example on night or overtime work; and the greater flexibility available, such as typified on some of the latest planers, shapers, milling machines and lathes."

Spicer—That there is something to be said on the part of the group motor drive, is pointed out by the Spicer Manufacturing Corporation: "One other point in the application of power deserves study from the dollars-and-cents angle and that is the power factor. In a plant equipped with many small motors it often happens that quite a few of them are seldom operating at full load. The result is a low power factor and if the power is purchased this inefficiency usually means a penalty rate. In such a case it may prove wise to substitute group drives through belting from a larger motor. Here again all factors must be considered, particularly the flexibility of machine arrangement attainable with individual motors. The nature of the product and the likelihood of changes will probably determine which system is most advantageous."

Hoover—An instance where individual motor drive was unattractive occurred within the experience of the Hoover Company. A graphic watt-hour test showed that the maximum load on each of four polishing lathes with individual motor drives would be around 25 hp., but that the required load would be 6 to 8 hp. It was shown further that the induction motor losses would cause a power-factor loss of about $800 or $900 per year. As a result of this test, four belted machines, driven from a single 20-hp. motor were installed, instead of four lathes each with a 15-hp. motor. The saving on the cost of equipment alone was $3,900.

Timken—The preference of the Timken Roller Bearing Co. is for the group motor drive with single-pulley machines, in production work. In the tool room individual motor drive is preferred. The steel mill equipment is driven by individual motors to make it the more easily serviceable by overhead cranes.

General Electric—When there are more plants than one under a single direction, and equipment is likely to be moved from one plant to another, an analysis of power conditions must be made. Because alternating current is available in one plant, direct current in another, and both at a third, the General Electric Co. has found it advisable, as a general practice, to order machines equipped with single-pulley drive. The company finds that machines with that type of drive are flexible enough for its purposes, because they can be set up in any combination, with any kind of driving motor, in any plant to which they may be sent. Another point in favor of the single-pulley drive is its more ready saleability to dealers in used machinery.

Gleason—For the machines bought by the Gleason Works, there is a strong leaning toward the individual motor drive: "We like the added flexibility that it gives, enabling us the more readily to expand and contract departments. It permits more light to reach the work, both day and night, adds to the appearance of the shop, and makes for cleanliness. Greater ease of operation is obtained, particularly on account of the electric start, stop, and jog systems now applied to most electrically driven machines. On many machines individual motor drive is more expensive than group motor drive, but again it must be borne in mind that power cost is not an inordinately high percentage of total cost of production."

National Cash Register—The scheme of power transmission by the National Cash Register Co. is the group drive, except on heavy machine tools, most of which are driven by individual motors.

Western Electric—Space requirement led the Hawthorne Works of the Western Electric Co. years ago to the conclusion that individual motor drive was the ideal arrangement. An advantage found to be pronounced is the flexibility of machine arrangement, "so vitally necessary when large departments have to be moved or reorganized to take care of changes in product. An exception to the general rule is pointed out in small bench units such as drill presses, where several were mounted as a portable bench unit, with a ball-bearing line shaft below the bench top, direct-coupled to a motor mounted in the center.

A Pat on the Back at Pocatello

BY JOHN MADDEN

At the Pocatello, Idaho, shops of the Oregon Short Line of the Union Pacific System, they believe that it pays to keep the shop clean, and have devised a banner that is awarded monthly for temporary possession to the department in the best shape on inspection day. The inspection committee gives no warning of its visit to a department. It is made up of the foremen of the stores department, fire department, and roundhouse, the fire chief, and the man in charge of safety and welfare.

Awards are made on the following points:

1. Cleanest department.
2. Material in order—neatly piled.
3. Absence of scrap or surplus material.
4. Lockers and drawers free from combustible material, none under or behind benches.
5. Safety first conditions.

The shop as a whole is divided into these departments, all of which participate: Erecting side, machine side, blacksmith shop, wheel room, tin shop, electrical department, tool room, brass room, air-brake department, miscellaneous department, boiler shop, tank shop, driving-box department, rod bench, valve bench.

While the banner is only a banner, it serves the purpose nicely. All that is needed to induce shop men to keep their house in order is to educate them to see how it pays—in greater production, easier work, fewer accidents, fewer errors. There is one thing more—let everybody know which group of men is the most successful. The pat on the back is a fine thing, in a football game, or in the shop. A visible evidence of success, the banner, is a pat that lasts for thirty days in the Pocatello shops.

Bonus Rights at End of Employment

BY G. B. STUART

CONTENTIONS regarding the payment of bonuses frequently arise between employer and employee when the latter severs his connection with the company where he is employed, or when he has been absent from his work on strike, or for some other irregular cause not satisfactory to his employer. Two judgments of the court in cases of this kind may, for this reason, be of general interest.

A certain Meredith was employed in a machine shop in Iowa from 1920 to March 31, 1922, when he voluntarily quit during a strike. The agreement under which Meredith was working was for a wage of 85 cents an hour, and an annual bonus of 5 per cent. The company refused to pay the bonus for the three months of 1922, whereupon Meredith brought suit and was rendered a favorable judgment by a jury. The company appealed the case, and the supreme court reversed the judgment in favor of the defendant.

The higher court contended that since no time of service was fixed by the agreement, the contract was not severable. The employee was entitled to and was paid wages at the rate of 85 cents an hour, but since he did not complete a year of service during 1922 he was not entitled to the bonus for the first three months of the year. The court decided that the bonus was to be paid for a year or not at all.

The case in the Missouri courts of one Wellington against the company for whom he had been acting as superintendent is illustrative of the rights of an employee to bonus money already assigned to him on the books of the company.

The company inaugurated a bonus system in 1918, and Wellington received payment for the years 1918 and 1919. In January, 1921, the general manager of the company advised him that his share of the bonus distributed for the year 1920 was $2,500, and that the amount was placed to his credit on the books of the company, with interest at 6½ per cent per year. Withdrawals of bonus money were to be subject to the approval of the management.

In April, 1921, there was a strike at the plant and the superintendent went out with the other employees. Upon request for the bonus money and interest, it was refused, and an action was brought to recover it, which was decided favorably to the plaintiff.

Upon appeal of the company the supreme court upheld the judgment of the lower court summing up the case as follows: Where a promise of bonus is made at the time of employment, such promise of additional compensation becomes a part of the original contract and is enforceable. When the promise is made after employment the status of the contract must be determined by the conditions.

The court affirmed that in this case the offer was considered a contract supplementary to that of the employment. According to this contract Wellington received his share during 1918 and 1919, and when in 1921 the company set aside $2,500 as the superintendent's share for 1920, a contract that was indefinite became definite, and was considered a unilateral contract not based on mutual obligations. Under such a state of facts the court maintained that the superintendent was entitled to the amount of the bonus assigned to him.

Press Tools Produce Sheet-Metal Clutch Covers

By Frank W. Curtis
Western Editor, *American Machinist*

Sequence of operations—Drawing and trimming the shell—Indexing-type die for piercing slots—Forming five pairs of driving tongues simultaneously

AN OUTSTANDING difference between the construction of dies for small and large sheet-metal parts is that those used for producing small work are made solid, usually of tool steel, requiring comparatively few pieces in their construction, whereas dies for larger work are lined with tool-steel inserts where friction or pressure occurs, and have the bulk of their weight in cast-iron or mild-steel backing. Some unusual examples of the larger types of dies are illustrated in the group of press tools that are used in producing transmission clutch covers. The cover is made of 0.125-in. thick, 19-in. square, extra-deep drawing steel. Blanking to 18⅜ in. in diameter, as shown in Fig. 1, is accomplished in a standard form of die, consisting of a cast-iron die shoe and punch holder in which a steel punch and die are inserted. Following this operation, the blank is formed as shown at *A*, after which it is washed, heat-treated, and pickled. In the second forming operation, the flange is flattened and the height of the shell is reduced as illustrated at *B*. At *C* is shown the result of the flange-trimming operation. The cover then is disk-ground on the flange face. The purpose of grinding is to insure a flat locating surface so that at assembly the clutch cover will seat properly against its adjoining part. A true flange face at this stage also assists in maintaining accuracy and alignment in the subsequent operations. Piercing the large hole as outlined at *D*, and the eight flange holes as shown at *E*, follow the disk-grinding. Five slots then are pierced in the wall of the shell as illustrated at *G*, an operation which is followed by the final operation, that of forming simultaneously the driving tongues shown at *H*. In this condition, after inspection the parts are ready for use.

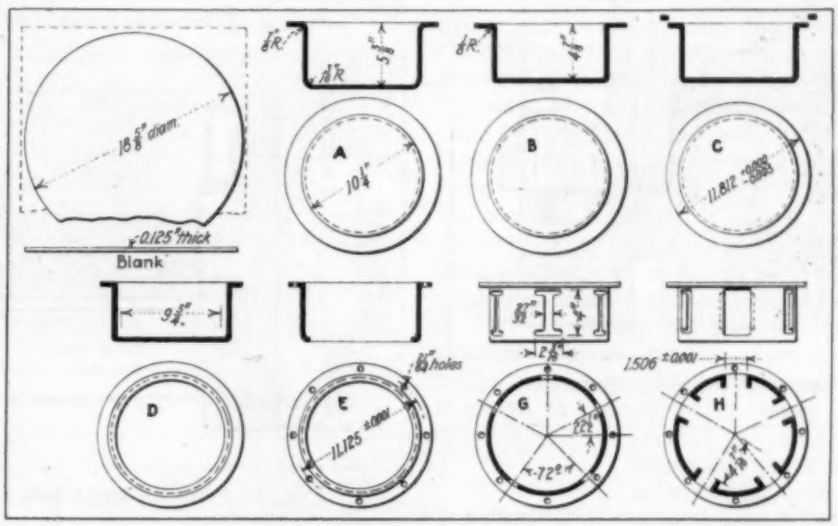

Fig. 1—Layout showing press operation of clutch cover

The pressure required in drawing a large shell is difficult to obtain by helical springs, so that in the first drawing die the blank is held in tension between the pressure ring *A* and the punch body *B* by four clamping studs, Fig. 2. This view shows the die at the bottom of the stroke, but when the blank is inserted the pressure ring is flush with the top face of the punch *C*, and is supported by six pressure pins. The blank is centralized in a recess in the pressure ring, after which the punch is lowered to the top face of the blank so that C-washers can be inserted as shown. The press has a special trip mechanism that provides for the punch to stop at this position on its downward and upward strokes. Tripping the press in this position causes the punch to continue downward, forming the shell, and to return to the intermediate or clamping position where the C-washers are removed. Then the punch is raised to its upper position, during which portion of the stroke the shell is ejected by the knock-out plate *D*. Operation of the knock-out plate is controlled by the two adjustable cap screws mounted in the knock-out bar. They strike stops attached to the bolster plate of the press when the ram is raised to its upward position. The die and the knock-out pin have air vents to overcome the pressure set up while the blank is being drawn. A 6-in. bolster plate is placed between the bed of the press and the die shoe. The die shoe *E*, the punch body, the pressure ring, and the die are made of cast iron, the last two having forged steel facings.

The second forming or flattening die, Fig. 3, is composed of a cast-iron die shoe that has the steel die *A*

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mounted in it, and a cast-iron punch holder that has the steel leveling ring *B* assembled to it as shown. When the die is open, the pressure plate *C* is raised above the top face of the die, in which position the shell is put on it. A knock-out plate, operating similarly to the

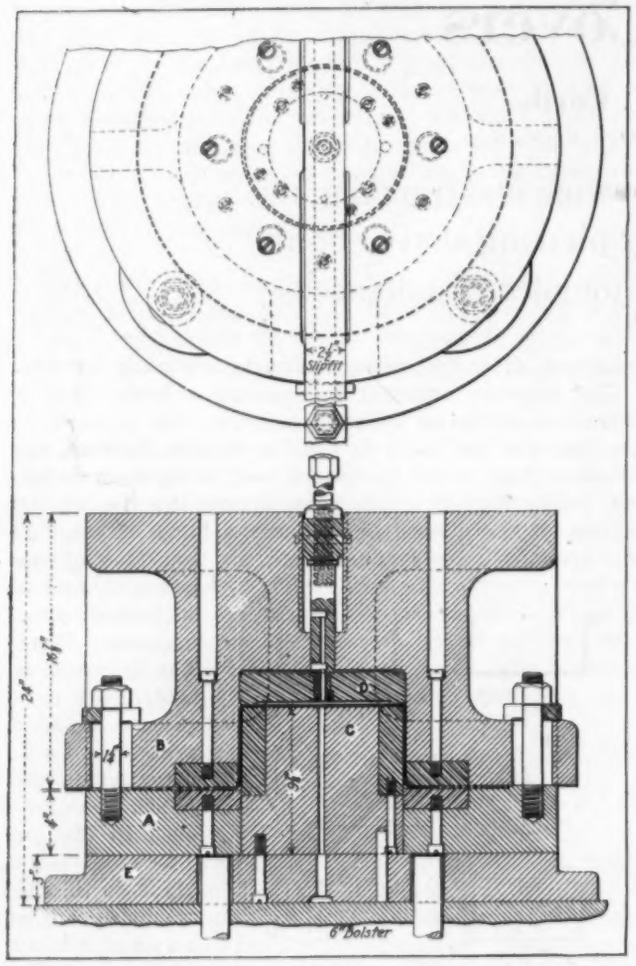


Fig. 2—Die for first drawing operation

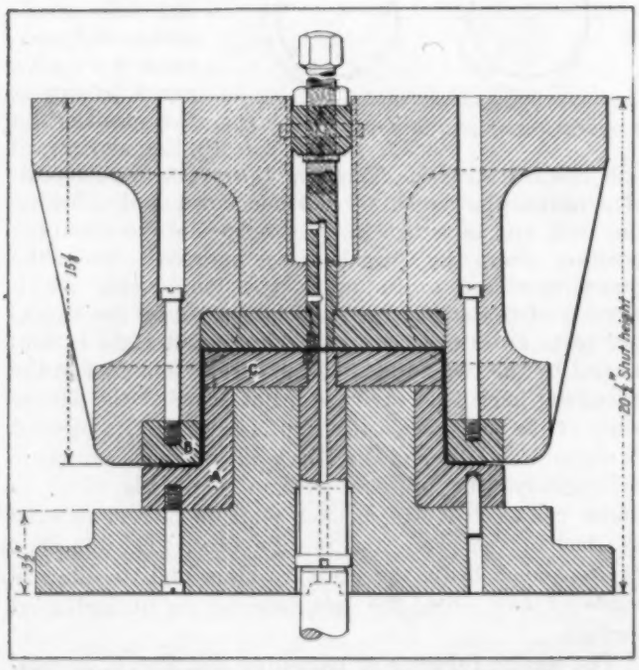


Fig. 3—Second form-die flattens shell to size

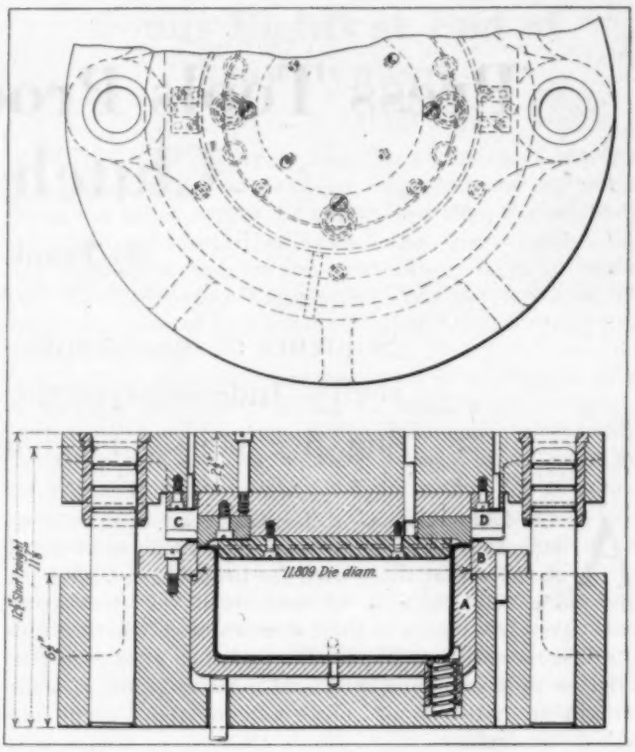


Fig. 4—Trimming outside flange surface

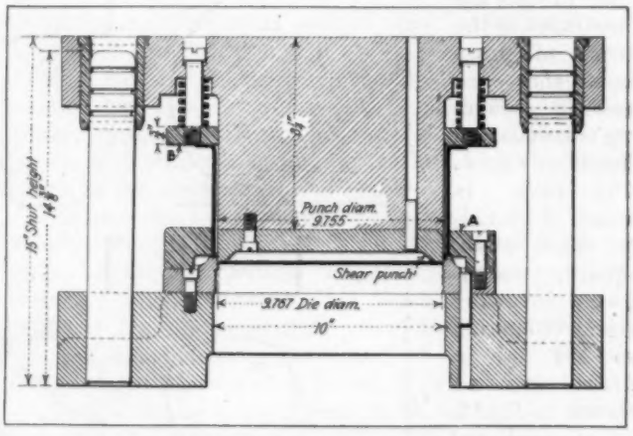


Fig. 5—Piercing large hole in closed end

one applied in the first forming die, is mounted in the punch holder.

For the trimming of the flange, the pillar press tools, Fig. 4, are used. The shell is dropped into the locating cup *A* that has four spring caps in its bottom face, on which the shell rests. In the normal position, the top face of the cup is flush with the cutting edge of the die ring *B*, while the work is ½ in. above it. When the punch descends, it strikes the work first, compressing it until the flange strikes the pressure cup. Further movement of the punch trims the flange as shown. The ring that is trimmed off is cut in two by the knives *C* and *D*. This feature simplifies the removal of the scrap portion.

Piercing of the large hole is handled in the die shown in Fig. 5. The shell is located in the nesting ring *A* with the closed end down. When the punch descends, the pressure ring *B* strikes the flange of the work and centers it before the hole is pierced. On the return stroke, this ring strips the work from the punch. The die assembly is composed of a cast-iron die shoe and

punch holder that are held in alignment by two guide pins. A tool-steel die ring and a punch are mounted to these units.

Eight ¼-in. holes are pierced in the flange of the shell by the die illustrated in Fig. 6. The work, placed in the die with the flange side down, rests on button dies. It is centralized by the gage plates *A*. The punch holder has a stripper plate on it that strikes the top face of the gage plate as the punch holders travel downward. The stripper remains in this position until the punches have been withdrawn from the work. The piercing punches are nested in the punch pad *B*,

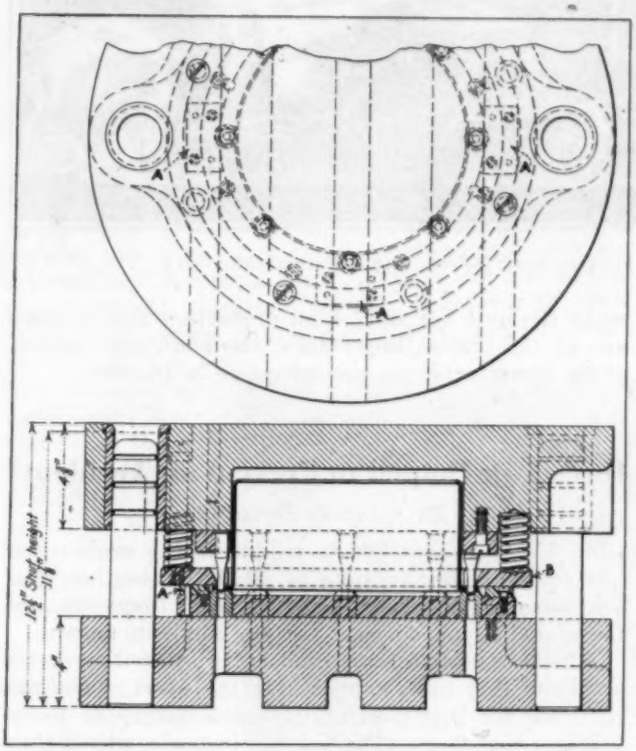


Fig. 6—Die for piercing eight flange holes

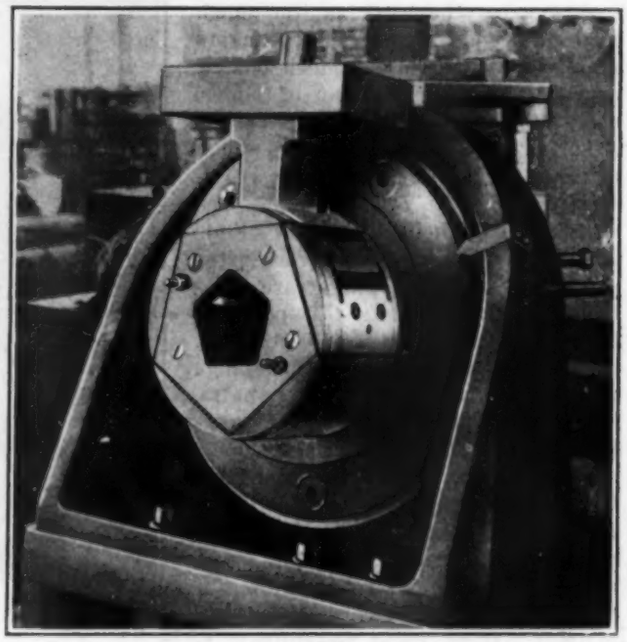


Fig. 8—Indexing die assembly with work-clamp removed

which is attached to the punch holder, as can be seen.

Following this operation the cover is placed in the indexing die, Fig. 7, in which five tongue slots are pierced. The die assembly is mounted on the angle plate *A*, attached to the bed of the press. Five dies *B* form a circular locating surface for the shell. For radial alignment of the work, one of the flange holes fits over the locating pin *C*. The clamping plate *D* is placed over the two studs *E*, then turned to the position shown, after which the nuts are tightened. On the punch holder are mounted the punch *G* and the stripper *H*. When one slot has been pierced, the plunger *K* is withdrawn by the handle *L*, after which the revolving portion of the die *M* is turned one-fifth turn. A device is placed on the side of the press so that it cannot be tripped unless the plunger *K* is properly indexed. The pointer *N* affords approximate indexing location. At *P* is shown the construction of the indexing arrangement. Ejection of the shell is accomplished by turning the handle *R*, attached to the ring *S*. The inner surface of this ring is made with five cam faces that operate the ejecting pins *T*. These pins in turn move the locating ring outward and loosen the work if it should stick to the dies. In Fig. 8, is shown the die assembly with the clamping ring removed. For the final operation, the die illustrated in Fig. 9 is used. To the left is shown a cover as it enters the die and at the right is shown a finished piece. Constructional details of the die are shown in Fig. 10. Owing to its size, only part of the die is illustrated. The work fits in the die on a locating ring. One of the tongue slot holes is used to give a correct radial position. The pressure

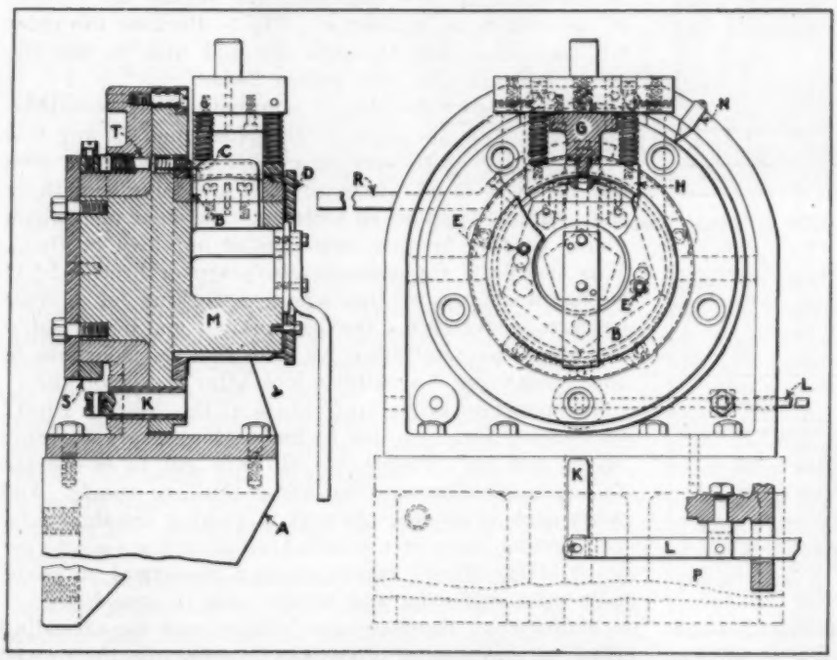


Fig. 7—Indexing die pierces five tongue slots

pad *A* grips the work as the punch holder descends. Five tapered plungers *B*, also attached to the punch holder, operate a similar number of slides, such as shown at *C*. Each slide has a spring pad and a forming punch attached to it as shown in the cross-sectional view at *D*. The slides are withdrawn by helical springs. Four ejecting plugs remove the work after completion. These plugs are controlled by the handle *G*, operating through two shafts *H*. Teeth that engage racks on the ejecting plugs are cut on the ends of the shafts. The two shafts are connected by gearing so that all the ejecting plugs operated in unison. These examples illustrate some of the possibilities that lie in the power press as a means of producing large work. The data were obtained from the Marmon Motor Car Co., Indianapolis, Ind. Dies of a simpler nature could be utilized to make the unit but since high production and accuracy are of the utmost importance, the additional expense of die construction was considered to be justified.

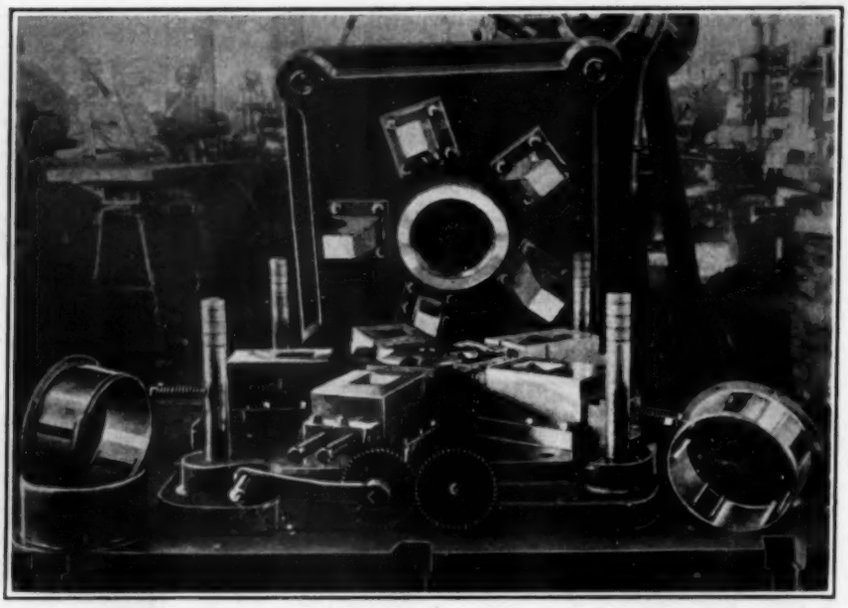


Fig. 9—Die that forms tongues simultaneously

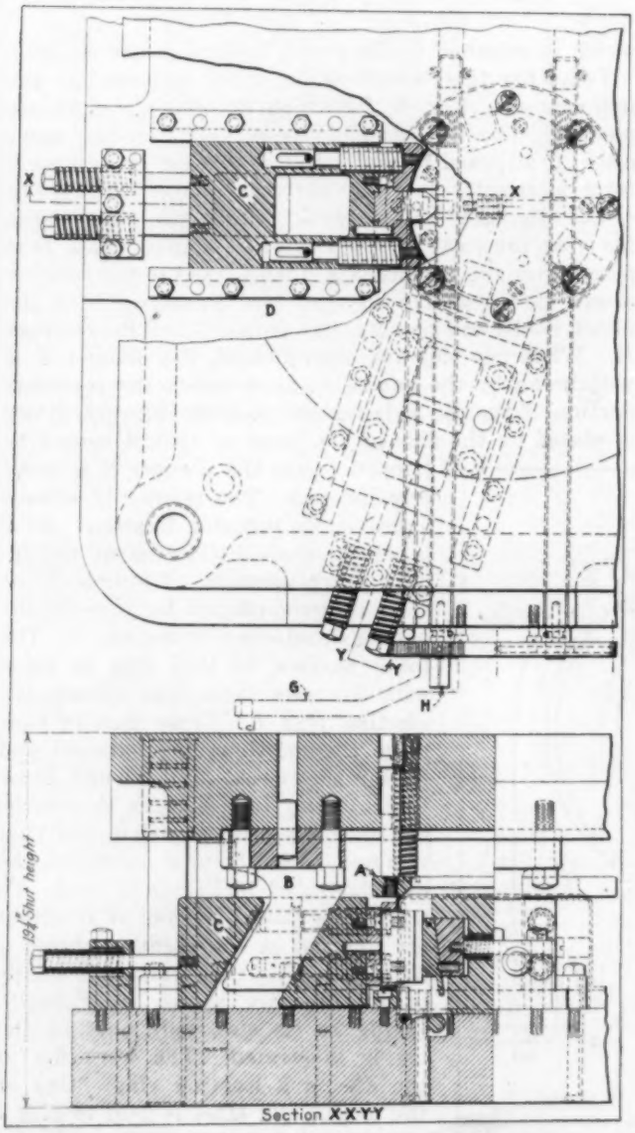


Fig. 10—Constructional details of tongue-forming die

Have You Helped to Prevent an Accident?

BY CHARLES DOESCHER

Accidents do occasionally happen in the modern tool and machine shop in spite of all the precautions that are being taken along "Safety First" lines and you, therefore, should do your part to eliminate them.

When we look over a year or two-year list of the accidents that have happened in the average machine shop, we find that most of the accidents happen to the younger mechanics. The boy, for instance, who is serving his apprenticeship or the young man who has just completed it are the ones who are usually the victims of the occasional accidents. Why? Because the older mechanic has been through the mill and, to use the common expression, has gotten "wise."

Now, in order to help to eliminate these occasional accidents, it is the duty of the older men in any tool or machine shop to keep an eye on these younger men and to tip them off whenever they are doing something that is likely to cause an accident. We older men would gladly do this for our own sons or our own brothers. Why not do it for someone else's son or brother? If we had a son or a brother who was working for another concern, would we not feel less anxious and better satisfied about their welfare if we knew that the older men in that shop make it a point to look after the younger?

Co-operation is the big feature of the "Safety First" movement, for, in order to make things safe for ourselves and our friends, we all have got to co-operate in helping to eliminate the things that are unsafe. And when each of us does his part in making the shop safe, he is doing some of the best kind of welfare work, for the "Safety First" movement is a movement to eliminate pain, suffering and misery, and to save lives.

Millions of families can "rejoice and be exceeding glad" at this coming Christmas time because their loved ones have come safely through another year.

Pneumatic Tubes Simplify Timekeeping in a Machine Tool Plant

By Frank Waldo

Timekeeping reduced through central recording station—Details of the pneumatic system—Time-recording forms used—Interdepartment messages conveyed by tubes

AN IMPORTANT aim in almost any plant is the reduction of overhead expense. The profits made in the manufacturing department, regardless of its size, can be lost if a proper overhead control is not maintained. Realizing the importance of this factor, the Sunstrand Machine Tool Co., Rockford, Ill., formerly the Rockford Milling Machine Co., and the Rockford Tool Co., has developed a timekeeping system that has made possible a substantial saving. A pneumatic tube system is chiefly responsible.

In the milling-machine manufacturing plant there are approximately 150 men engaged in various kinds of machine and erection work who often change from one job to another in the course of a day. Sometimes a man is placed on several jobs in a day, each of which requires an individual time record. To handle the timekeeping for this department formerly required three timekeepers who were kept busy a majority of the time in checking the work as it was distributed to the workmen and recording the time of its completion. Since the pneumatic tube system was installed, in addition to a slight change made in the recording forms, the work has been handled by one timekeeper who not only checks the "in" and "out" time of each job but also assists with the payroll and attends to the information window.

Fig. 1—Central time-recording station

The pneumatic system consists of a central receiving station, illustrated in Fig. 1, that is connected by tubes to four stations located in the factory. A close-up view of the central station is shown in Fig. 2. To the right may be seen the receiver from which the carriers are dropped to the desk, while to the left of the receiver are shown the sending tubes that convey the carriers back to the shop. The carrier is placed in its respective tube and the operator turns on the air to force the carrier through the tube. The system, operated by a 5-hp. motor, has been in operation seven years, during which time no repairs have been required.

When an operator in the shop starts a job, the foreman makes out an assignment slip, such as illustrated in Fig. 3, and places it in a carrier that transports it to the timekeeper. Less than a half minute is consumed in conveying the slip from any one of the four shop stations and in most cases the timekeeper receives the slip before the actual work is started. Upon receiving the slip at the central station, the starting time is recorded thereon in the lower left-hand corner as well as on the duplicate, shown in Fig. 4, and the triplicate. The original slip is filed by the operator's number for future reference and the duplicate is held by the timekeeper in the rack shown at the right in Fig. 1. When the job has been completed the foreman makes out a new slip, indicating on it details of the next job to be started and also the job just completed. Then the timekeeper records the time on the new duplicate for the job just started as well as on the old duplicate. The old duplicate is removed from the rack and replaced by the new duplicate. The old duplicate then is ready for labor extension and posting on a job card, after which it is used for com-

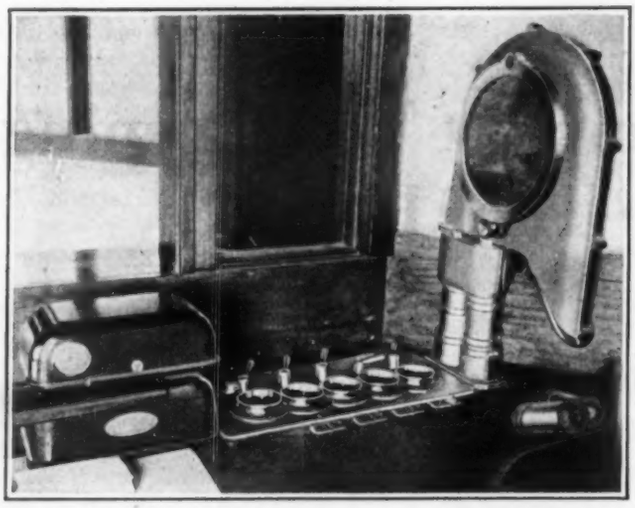


Fig. 2—Close-up view of receiving and sending tubes

puting the payroll. In this way there is no time between jobs unaccounted for.

On the duplicate slip there are provisions at the left-hand side for several time stamps that are used daily in the event the job is carried over from one day to another. When this condition exists it is not necessary for the foreman to make a report of the work in process to the timekeeper since the stamping signifies that no new assignment has been made. At the close and beginning of each day the timekeeper stamps the time on all the slips, indicating unfinished work. In addition to the slips illustrated, there are similar forms used for recording fixture and repair work, and nonproductive work, so that a time record of all the employees in the shop is recorded. The payroll and a record of time consumed in each job are taken from the duplicate slips.

In addition to the time-recording work, the pneumatic system is used for transporting interdepartment messages throughout the shop and office. An improvement is to be installed in the form of a signal system that will be controlled by the central station. It will consist of a signal light at each foreman's desk that will be flashed when a carrier is in his tube. When the carrier is picked up, the foreman will disconnect the signal light, indicating that he has received the carrier.

FORM 1147 **ASSIGNMENT SLIP**

NOTE— No Job is to be Registered "IN" or "OUT" by Time Clerk, only when this slip is Produced Properly Filled Out and Signed by Foreman.

DATE 6/30/26	STARTING NEW JOB	UNIT or PART NO. C.D. 415	FINISHED OLD JOB	UNIT or PART NO. B 162	
CLOCK NO. 52		LOT or ORDER NO. 3176		LOT or ORDER NO. 4253	
DEPT. NO. 112		OPERATION NO. & NAME 4 Turn		OPERATION NO. & NAME 4 Turn	
REMARKS		PIECE WORK / DAY WORK		PIECE WORK / DAY WORK ✓	
6/30 3.0		Have you worked on this operation before ? YES. ✓			
		Is operation on Old Job Completed ? YES. ✓ NO.			
		FOREMAN			

Fig. 3—Assignment slip made out for each job

CLOCK NO. 52	NAME A. Petterson			DEPT. NO.	
	Unit Number or Part No. B 162				
	Lot or Order No. 4263			Piece Work	Day Work
	Operation No. and Description 4 Turn				
	Pieces Started	Machine No.		Piece Rate	
	Pieces Spoiled	Pieces Paid For		P. W. Amount	
	Pieces Defective				
	Pieces Passing	Hours	Rate	D. W. Amount	
	Pieces to Correct				
	Pieces Good	No. Machines Run		Piece Earned	
6/30 3.0					
6/30 2.8	.2	Foreman or Inspector		Form 221	

Fig. 4—Duplicate slip used to record shop work

To See Ourselves

By Loring Roper

"I'm plumb discouraged," said Builder A,
"And I wonder if it pays
To build the best high-grade machine
With the best of gears and ways?
To use the best of steels and such
To scrape each bearing true,
'Til every part is fitted right—
Does it pay—I'm asking you?

"The users do not seem to care,
'Tis price that governs sales;
Or they hang to old, worn out machines,
And tell their poor-house tales.
They won't replace when the new machine
Would cut the costs in two;
And how can I build my high-grade tools
If they don't buy—could you?"

"It makes you blue," said Builder B,
"At the false ideas of thrift
That I find in shops with old machines,
As over the map I shift.
Now there's Builder A, makes a good machine,
But his costs are out of sight;
He won't throw out his wornout tools
And fit his shop up right.

"He drives a most expensive car,
And says it pays him well,
But he sticks like death to his old machines
'Til there's no use trying to sell."
And Builder B has his critic too,
For he wastes his time they say,
And buys neither wisely, nor too well
Of the tools he would find to pay."

'Twas Bobby Burns in the days gone by
Wrote the lines that shall last for aye—
"Oh, wud some po'er the giftie gie us
Tae see oorsels as ithers see us."

There is no doubt that the Master Tools of Industry should be not only highly productive but extremely accurate. That they should be built by the best of mechanics goes without saying.

One of the activities of the welfare committee of a large railroad shop is to pay particular attention to newcomers in the shop. In some cases the helpfulness extends to "staking" a new man to enough to carry him until his first pay. This is a very practical way of making a man appreciate his new job.

Denver & Rio Grande Welding

By L. C. Morrow
Managing Editor, *American Machinist*

Liners welded to driving boxes—Syphons welded in—Cellars built up—Pilot beams repaired—List of boiler, cast-iron and locomotive parts welded

WELDING is common practice in the Salt Lake City shops of the Denver & Rio Grande Western. Its use has reached such proportions that it is as much a necessity as are the old, stand-by machining methods.

As illustrated by Fig. 1, jaw liners are welded to driving boxes. The liner is held to the box by the special clamp shown, and is welded at the top and bottom only. Boiler plate stock and thinner plate are used, depending upon the thickness of liner required. The example shown is a box bored out of center, and the liner being applied is made of boiler plate to provide sufficient thickness to allow the off-center error to be corrected. The electric-arc method of welding is used.

Driving-box cellars are built up as shown in Fig. 2, by means of the gas torch and bronze welding rod, to keep the box from closing in and pinching the brass on the axle. They are ground to fit the driving boxes.

Syphons are welded to the syphon sheets and the sheets are welded into the fire box as shown in Fig. 3.

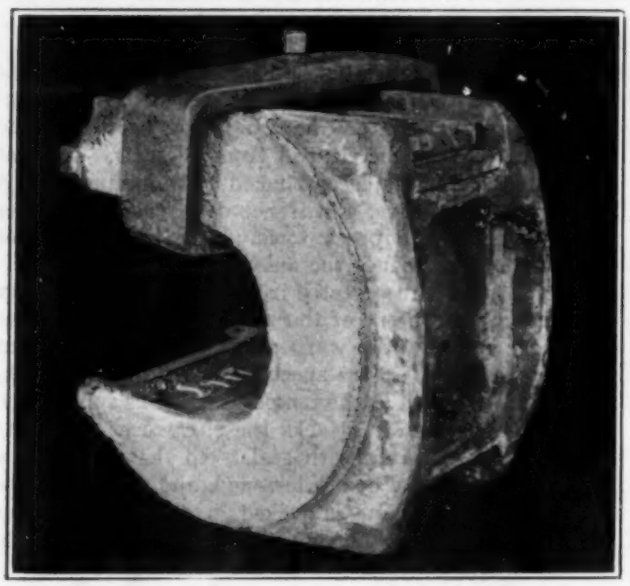


Fig. 1—How a jaw liner is clamped in place on the driving box preparatory to being welded

Fig. 2—Cellar built up by welding

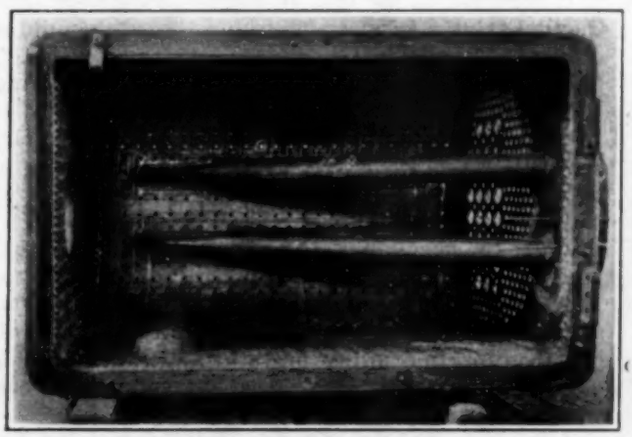


Fig. 3—Syphon sheets welded into fire box

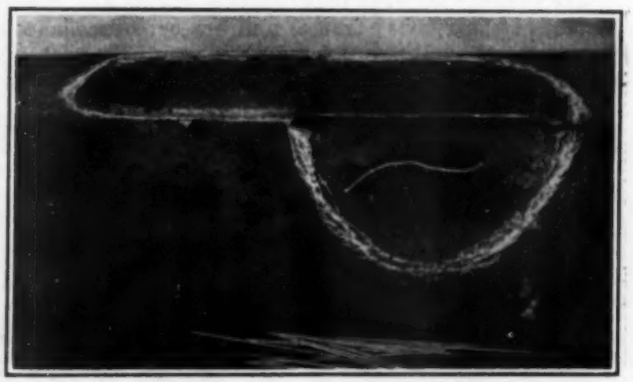


Fig. 4—Reconstructing a broken pilot beam by welding

The electric-arc method is used for these operations. The electric arc is used also for such work as repairing pilot beams, an example of which is illustrated in Figs. 4 and 5. In that part of the beam shown in Fig. 4 pieces were broken from the top and side, as indicated by the chalk marks. The first part of the repair operation consisted of welding a piece of thick plate into the side, a relatively simple job. Then a piece of boiler

Fig. 5—End of pilot beam being prepared for welding

plate was cut to the shape of the opening in the top, where it was held in place by a bar tack-welded to it. The bar was long enough to rest on the pilot beam at both ends of the break.

With the repair plate in place, a sheet-steel guard, wider than the patch, and about 14 in. high, was tack-welded to the supporting bar at its center to provide protection for two operators, one working on each end. The actual welding-in of the patch was only partially finished when the supporting bar and the guard were knocked off for the photograph to be taken.

The broken end of the beam, being set in place for welding, is shown in Fig. 5. The two parts will match fairly well, but it will be necessary to insert some patching plates as well as to do straight welding.

Boiler-parts welding includes: Crown to side sheets; new half-side sheets; three-quarter flue sheets; smoke-arch sections; combustion chambers; syphon sheets (as illustrated); fire-door rings; flues in back end; petticoat pipes; cylinder-head casings.

Cast-iron parts welded consist of cylinders, valves, truck boxes, cellars (illustrated), pump parts.

Other parts of the locomotive that are repaired by welding include: Miscellaneous worn and defective brass parts; rod brasses (built up for lateral); steel castings and forgings; driving boxes (illustrated); crossheads; brake beams (for wear only); stoker flights and miscellaneous stoker parts; frames and braces; miscellaneous brackets; odd and oversize holes (plugged); special pipe fittings; and radiator coils.

Although working hours have been shortened the output of men in industry is being increased by the use of more and better machinery. The steel industry shows an increase of nearly 50 per cent since 1914.

In a big rubber factory modern machinery has reduced the number of men in one division from 1,300 to three in the last five years. Expansion of the market for rubber products has so increased the activity of other departments that the other 1,297 are still on the company payroll but doing different work.

Clean Annealing

By A. L. Walker
London, England

IN SPITE of the success of the various types of "bright" annealing furnaces there are still a good many concerns that stick to the old method of packing parts to be annealed. Whether the cause for it is lack of funds or just prejudice, would be hard to say. Quite probably both factors have some bearing. There are some few points in favor of the old method. For the treatment of soft-iron parts, as used for electrical purposes, pack annealing cannot be beaten by even the most modern of "bright" furnaces.

The great trouble with pack annealing is the scaling of the parts. No matter how good the boxes may be at the start, they soon warp, thus letting in sufficient oxygen to mar the surfaces of the parts being treated. Of course, the cracks are luted with fireclay, asbestos, etc., but under the intense heat the luting opens out. Many of the boxes purchased are of a nickel-chrome alloy, and are specially ribbed, but in the experience of the writer not one of them will last more than six months or so. At the present price of the component metals these boxes form an expensive item.

Removing the Scale

About half the annealing is done in order to facilitate further press operation, such as fairly deep drawing. So that the parts after annealing may be fit for the press, they have to be cleaned from all scale. In most cases the cleaning is accomplished by tumbling, but it is slow and expensive, and if not done properly causes much wear to the press tools. Clearly, the proper thing to do is to reduce the amount of scale.

Scale forms because heated iron or steel has an affinity for the oxygen content of the atmosphere. Consider the conditions existing in a warped box. A certain amount of air is contained in the spaces between the iron packing pieces. As soon as the temperature rises sufficiently, the oxygen in the air attacks the surface of the parts and coats them thinly with scale. In the process, the volume of air in the box is lessened, and to compensate for this more leaks in—is sucked in, would be a better expression. This cycle of operations continues throughout the whole time the temperature is high enough to permit oxidation.

Using Aluminum Borings

It occurred to me that if another body were introduced, having a greater affinity for oxygen than did the steel parts, they might escape some of the oxidation. To this end, I put in a box a quantity of aluminum borings. Since aluminum scales to a very slight depth only, the borings were as fine as possible so as to present a large area. As a precaution against sticking, the borings were placed in a sheet-iron cup. Afterwards it was found that this measure was unnecessary.

After the usual annealing period, the contents of the box were turned out and examined. Scale had formed, but it was exceedingly thin and soft. A very short tumbling was sufficient to give the parts a good finish suitable for a drawing operation. For the rougher kinds of press work, it is probable that tumbling could entirely be omitted.

I think it will be well worth while for anyone who is compelled to use pack annealing to give this idea a trial.

Agricultural Implement Plants Need New Equipment

Over one-half of the metal working machines in service, according to a recent count, were purchased ten or more years ago

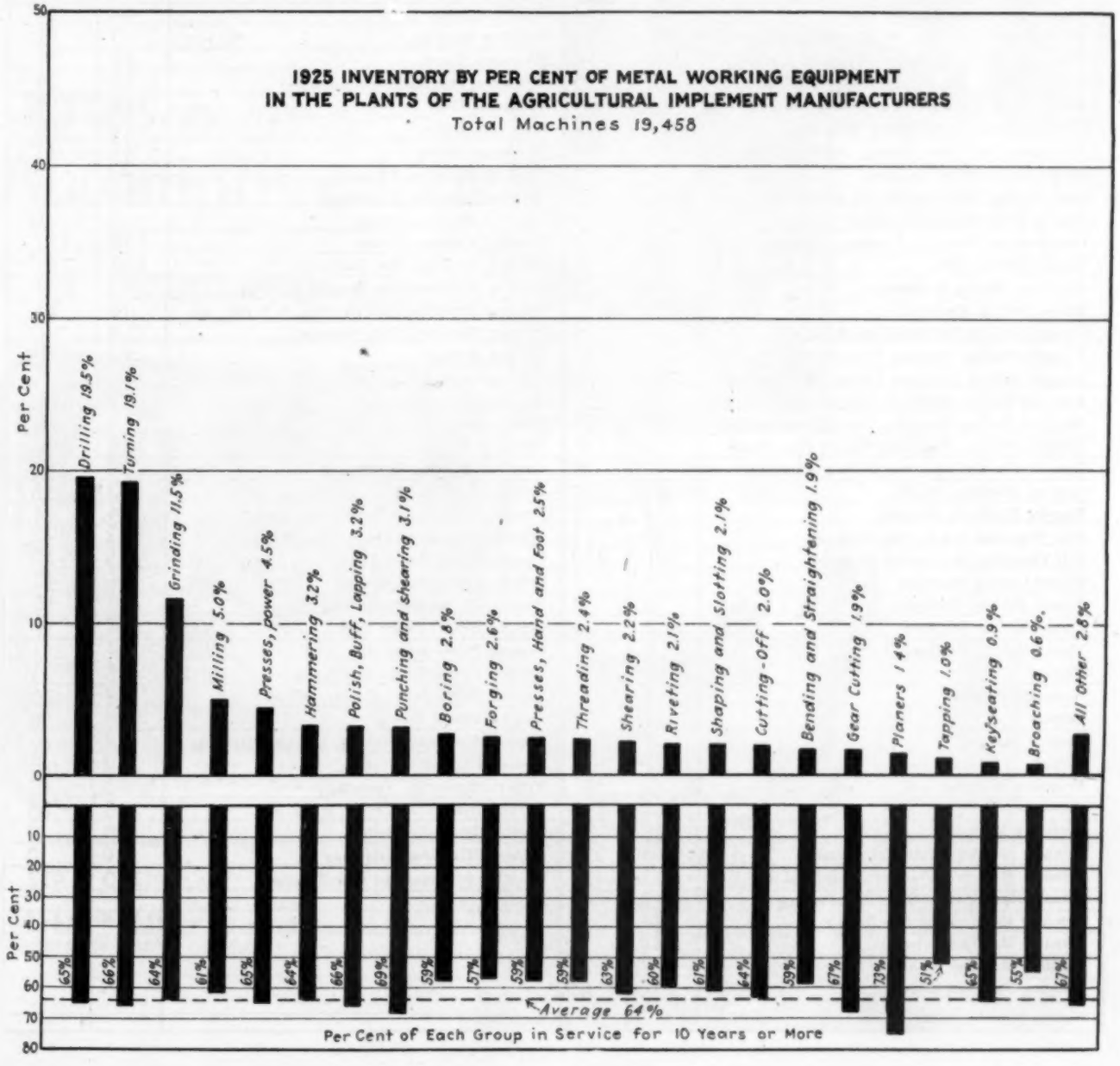
THERE are approximately 19,500 metal working machines in the plants engaged in the manufacture of agricultural implements. The plants themselves, counting all that employ six or more men, total approximately 200.

The item of machines was determined by means of a questionnaire sent by the *American Machinist* to this division of the metal working industries.

The total number of machines has been divided and is grouped, according to operations performed, in the chart shown below. The grouping is arranged in order of importance and in terms of per cent of the total. At the bottom of the chart is shown the proportion of each group that has seen ten years, or more, of service.

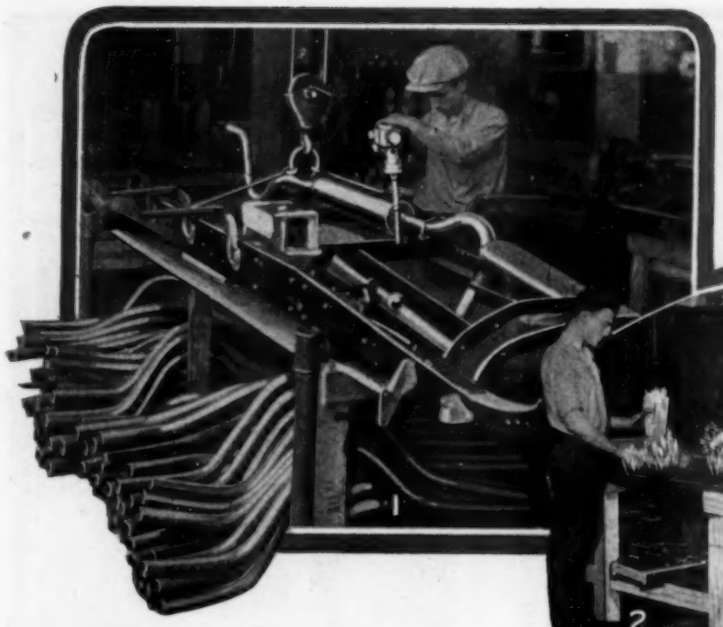
The body of the original questionnaire is reproduced on the following page and is filled in with the detailed totals of the classes of machines in service, obtained from the questionnaire returns as follows:

The returns were added to give actual counts for each class and the total was determined. This total was then expanded, and each class count expanded with it, to the census count for total men in the division.



METAL WORKING MACHINES IN THE AGRICULTURAL IMPLEMENT PLANTS

Kind of Machine Tool	A Number Built Before 1915	B Total Number in Plants 1925	Kind of Machine Tool	A Number Built Before 1915	B Total Number in Plants 1925
Engine Lathes	1321	1883	Grinding Machines, Floor, No Feed Attachments	745	971
Hand Turret Lathes	84	120	Grinding Machines, Bench, No Feed Attachments	88	190
Power Turret Lathes	537	931	Grinding Machines, Disk	77	124
Semi-Automatic Lathes	22	33	Grinding Machines, Belt	29	40
Hand Screw Machines	66	117	Grinding Machines, Centerless	0	0
Automatic Screw Machines, Single Spindle	149	219	Polishing and Buffing Machines, Wheel	327	456
Automatic Screw Machines, Multiple Spindle	40	66	Polishing and Buffing Machines, Belt	84	161
Chucking Lathes	15	26	Polishing and Buffing Machines, Semi-Automatic	4	7
Multiple Spindle Chucking Machines, Rotary Work	0	0	Lapping Machines	0	0
Multiple Spindle Chucking Machines, Rotary, Tools	0	0	Honing Machines	0	0
Speed Lathes	80	110	Cutting-Off Machines, Parting Tool Type	26	40
Bench Lathes	18	37	Cutting-Off Machines, Power Hack Saw Type	157	241
Tool Room Lathes	131	178	Cutting-Off Machines, Rotary Cold Saw Type	58	91
Wheel Lathes	4	4	Cutting-Off Machines, Band Saw Type	15	22
Axle Lathes	29	33	Cutting-Off Machines, Friction or Hot Saw	4	7
Forge Lathes	0	0	Shears, Knife	190	270
Hand Milling Machines	77	106	Shears, Rotary	47	99
Bench Milling Machines	4	4	Shears, Slitting	44	77
Plain (Knee and Column Type) Milling Machines	248	376	Nibbling Machines	7	15
Universal (Knee and Column Type) Mill. Mach.	110	214	Hammers, Steam	55	77
Vertical (Knee and Column Type) Mill. Mach.	80	120	Hammers, Pneumatic (not portable)	22	29
Lincoln Type Manufacturing Milling Machines	26	69	Hammers, Drop	190	318
Semi-Automatic Type Milling Machines	4	7	Hammers, Helve	106	139
Continuous Mill. Mach. Rotary or Drum Type	0	4	Hammers, Spring	40	77
Planer Type Milling Machines	58	84	Riveting Machines, Pneumatic	62	113
Gear Cutting Machines, Rotary or Milling Type	117	164	Riveting Machines, Hydraulic	18	33
Gear Cutting Machines, Hobbing Type	99	175	Riveting Machines, Steam	0	0
Gear Cutting Machines, Planing or Shaping Type	37	37	Riveting Machines, Power	175	277
Vertical Boring Mills	190	325	Forging Machines, Hot, Bulldozers	223	301
Horizontal Boring Machines	146	237	Forging Machines, Hot, Forging Machines	47	177
Radial Drilling Machines	628	931	Forging Machines, Cold Headers, Bolt, Nut, etc.	18	22
Upright Drilling Machines, One Spindle	1314	1938	Forging Machines, Cold, Swaging	4	7
Upright Drilling Machines, Two or More Spindles	259	460	Bending Brakes	62	131
Upright Drilling Machines, Two or More Heads	44	55	Bending Rolls, Horizontal	150	219
Sensitive Drilling Machines, One Spindle	223	361	Bending Rolls, Vertical	7	11
Sensitive Drilling Machines, Two or More Spindles	33	69	Straightening Rolls	7	18
Sensitive Drilling Machines, Two or More Heads	4	11	Punching Machines	259	376
Two-, Three- and Four-way Drilling Machines	11	18	Combined Punches and Shears	164	230
Tapping Machines, Single	58	120	Presses, Hand, Arbor	193	318
Tapping Machines, Multiple	44	77	Presses, Hand, Light Punch Press Work	4	11
Pipe Threading and Cutting Machines	80	128	Presses, Foot, Light Punch Press Work	102	172
Bolt Threading and Cutting Machines	201	343	Presses, Power, Crank Type	485	730
Thread Chasing Machines	4	4	Presses, Power, Toggle Type	26	47
Thread Hobbing Machines	0	0	Presses, Power, Double-Acting Type	11	15
Thread Milling Machines	0	4	Presses, Power, Dieing Type	7	7
Thread Rolling Machines	4	4	Presses, Power Automatic	4	11
Planers	204	281	Presses, Power, Trimming Presses	18	33
Open-side Planers	7	7	Presses, Power, Forcing, Arbor, Wheel	22	29
Shapers	234	372	Presses, Power, Baling	0	0
Vertical Shapers	0	7	Presses, Hydraulic, Bending, Forming, Drawing	22	26
Slotters	22	36	Presses, Hydraulic, Forging	0	0
Broaching Machines	73	131	Presses, Hydraulic, Flanging	11	15
Keyseating Machines	124	190	Presses, Hydraulic, Forcing, Wheel, etc.	15	18
Centering Machines	58	88	Presses, Hydraulic, Baling	0	0
Grinding Machines, Plain Cylindrical	205	398	Presses, Hydraulic, Extruding	0	0
Grinding Machines, Universal Cylindrical	77	157	All other machines and miscellaneous	270	412
Grinding Machines, Surface, Reciprocating	29	47			
Grinding Machines, Surface Rotating	44	73		12,545	19,458
Grinding Machines, Internal	44	73			
Grinding Machines, Cylinder	11	22			
Grinding Machines, Cutter	113	164			



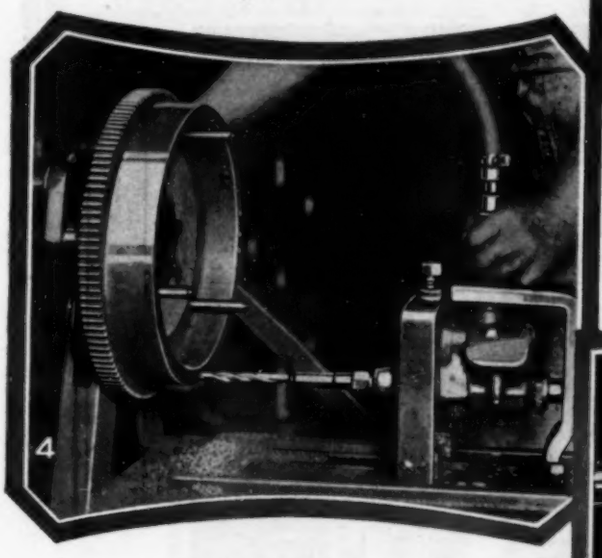
1 — Assembling mufflers and exhaust pipes—Chrysler

2 — Various pipes needed for brakes — Chrysler

A Variety of Automotive Jobs

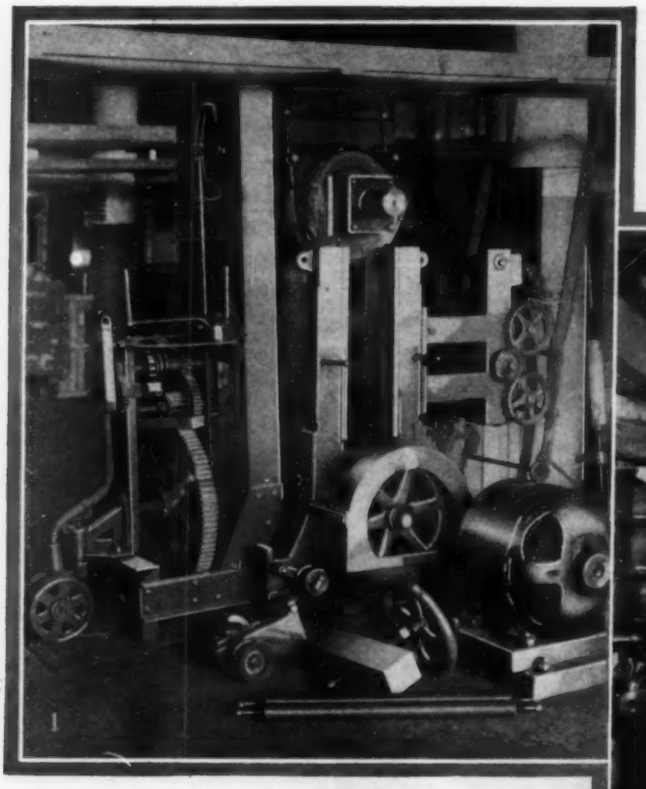
Photographs by courtesy of the Ingersoll-Rand Co.

3 — Tightening nuts on steering knuckles—Buick



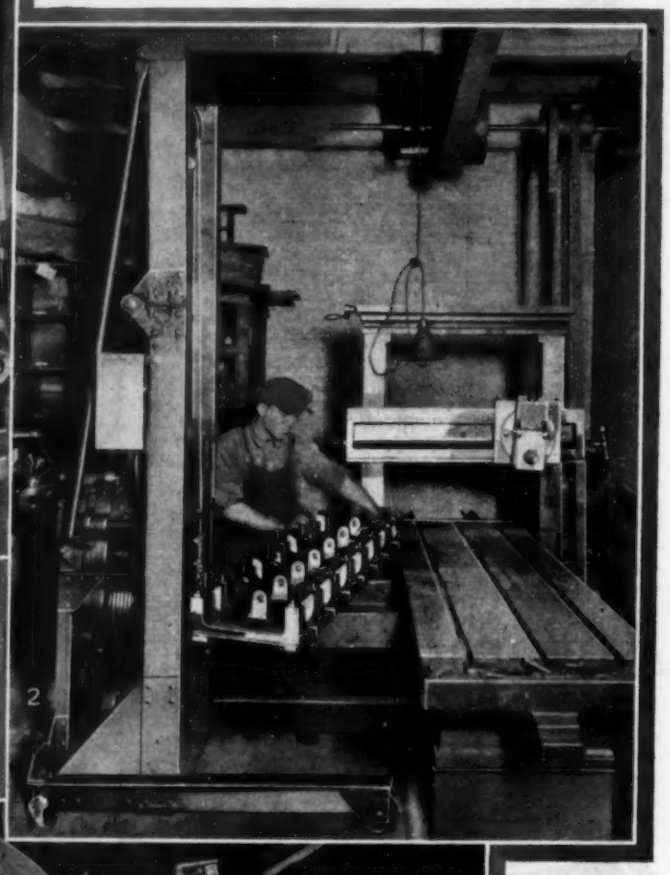
4—Drilling balance holes in flywheels—Hupp

5—Forms for bending copper tubing for hydraulic brakes—Chrysler



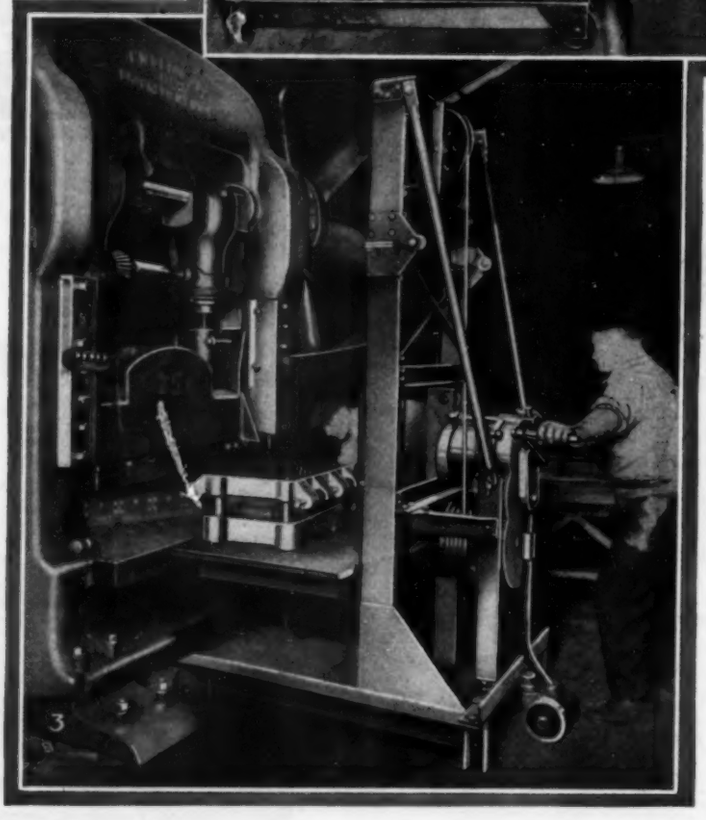
1—By inverting the load platform and providing slings, this portable elevator performs the task of removing the heavy rolls from an embossing press. The conveyor which is above the press prohibits the use of any overhead lifting device.

2—A boy can handle jigs and fixtures on and off the planer and milling machine. The hinged frame of the portable elevator provides for "b r e a k i n g" the elevator for passage through doorways.

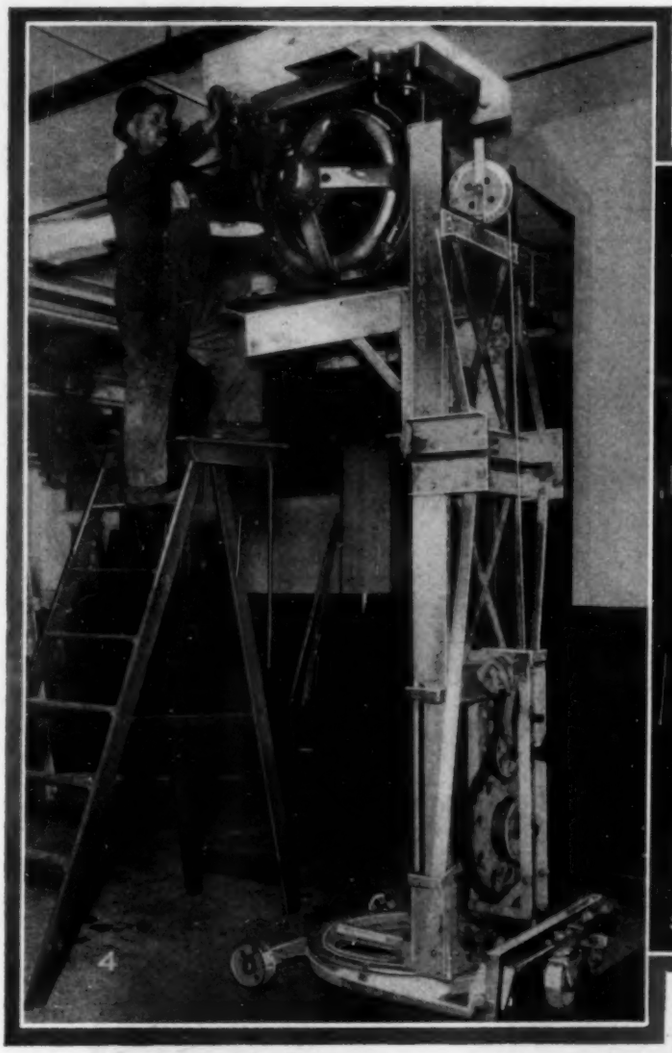


The Versatility of Portable Elevators

Secured through the courtesy of Frank L. Eidmann, School of Engineering, Princeton University

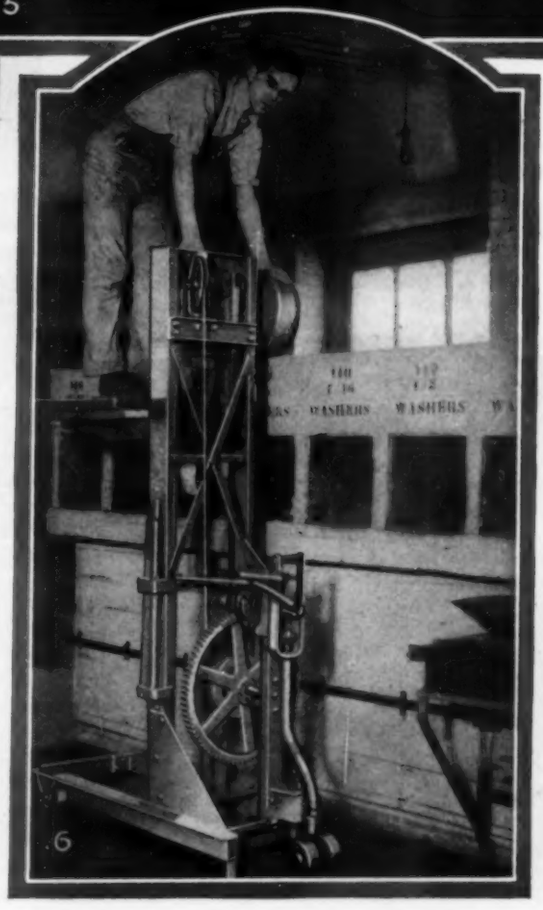


3—A difficult job made easy. Changing the dies of a large power press.

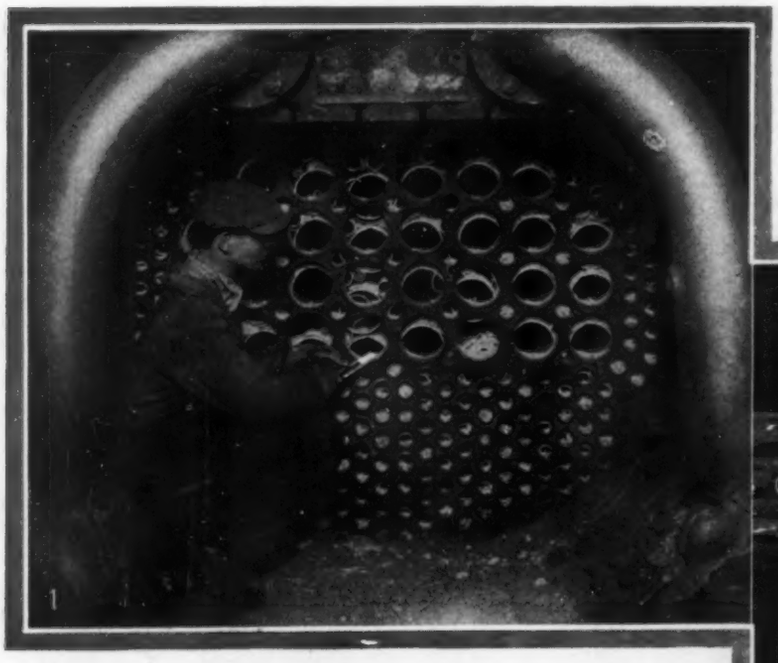


4—A labor-saver for the mill-wright. Without the portable elevator, several men would be required for this job.

5—A flexible system in the finished-stores room. The parts are kept in tote boxes which are pushed onto the shelves from the portable elevator platform which is fitted with rollers.



6—A small hand-power portable elevator loading bolts into the hoppers of self-feeding storage bins.



1—Flues cut out with pneumatic cutter — Pittsburgh & Lake Erie R.R.

2—Cutting off ends of flues—Lehigh Valley R.R., Sayre shops

Flue Work
in the boiler shop

3—Electric welding of safe ends—Compressed air controls raising and lowering of rails—Lehigh Valley R.R., Sayre shops

4—Welding and swaging new ends on flues—Pittsburgh & Lake Erie R.R. shops, McKees Rocks

Photographs by courtesy of the Ingersoll-Rand Co.

Automotive Production

Cylinders for Outboard Motors

By Frank W. Curtis
Western Editor, *American Machinist*

Inspecting castings for leakage—Boring and reaming cylinders—Various drilling operations—Milling the ports—Hand-reaming and grinding the bore—Material-handling truck

OUTBOARD motors attached to small boats and canoes form units from which a great deal of pleasure can be obtained. Such motors are made in single- and twin-cylinder types to suit the kind of boats they are to propel. In the production of cylinders for the 1½-hp. engine in the plant of the Johnson Motor Co., South Bend, Ind., modern tooling methods, based on production requirements, are in evidence. The cast-iron cylinder, details of which are shown in Fig. 1, is of the two-cycle type, having ports cut on the inside of the bore. Castings are tested for cracks, leaks and other imperfections by water pressure, as illustrated in Fig. 2. The cylinder is clamped on both ends and two sides in the fixture, after which water at 20-lb. pressure is applied through the cored water-chamber. A gage is used to register the pressure. The first machining operation is the boring, reaming, facing, and chamfering of the open end on the Potter & Johnston machine shown in Fig. 3. Three boring cuts are made, sizing the bore to 1.868, 1.923 and 1.972 in., respectively. The V-block chuck is provided with a swinging clamp, tightened by an eyebolt. One operator runs two machines and the time per piece is 7½ min. The machine is operated at 150 r.p.m.

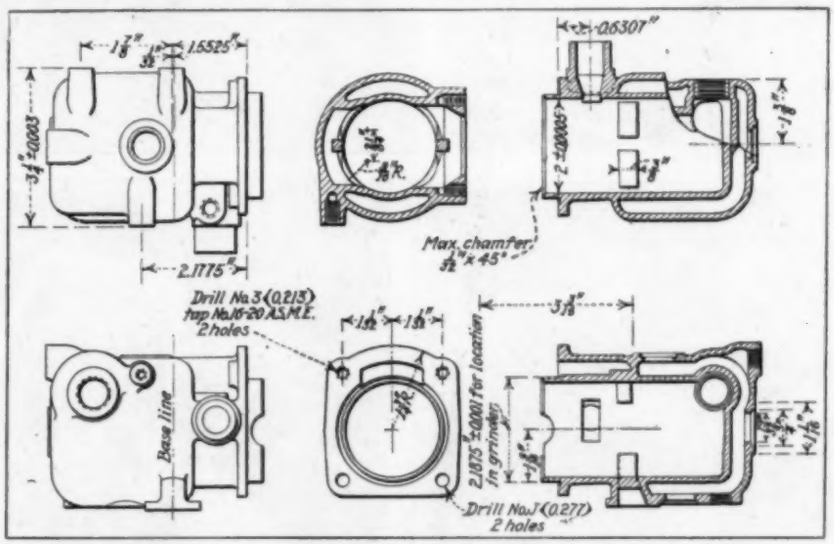
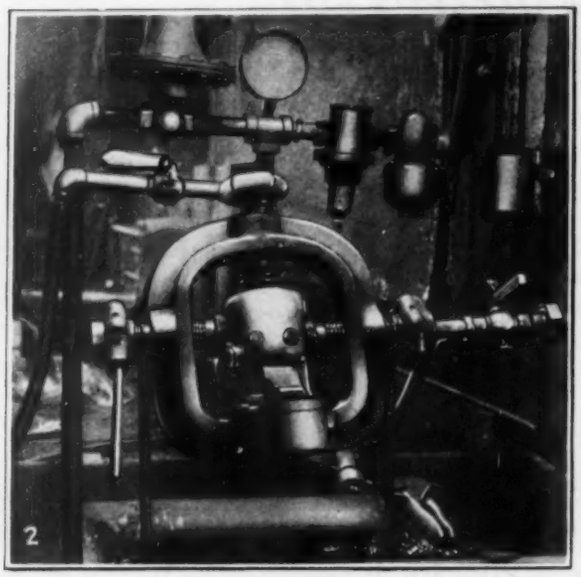
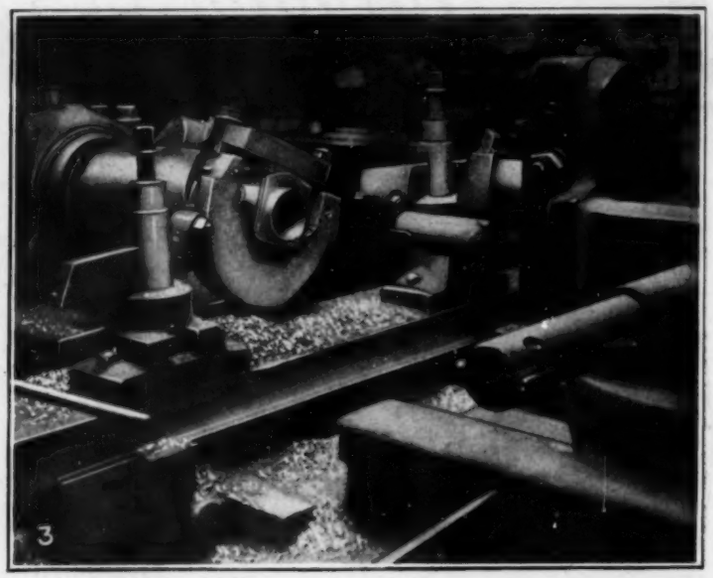

Max. chamfer 1/16" x 45°
Drill No 3 (0.213) tap No 16-20 A.S.M.E. 2 holes
Base line
2.1875"±.0001" for location in grinder
Drill No J (0.277) 2 holes

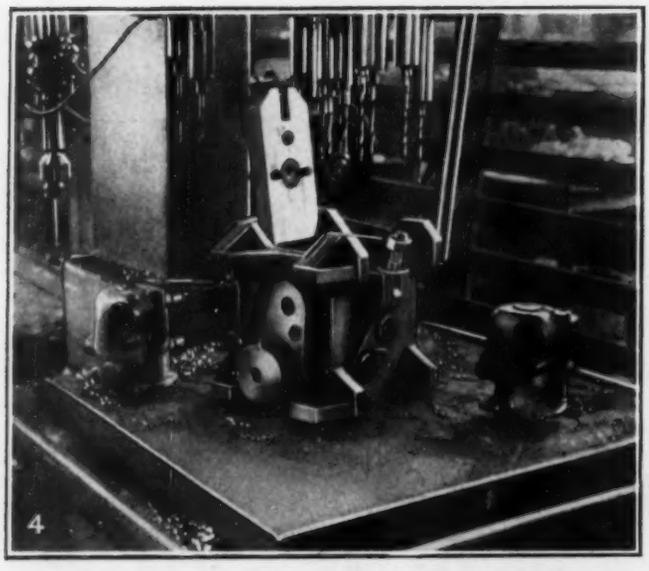
Fig. 1—Details of 1½-hp. engine cylinder

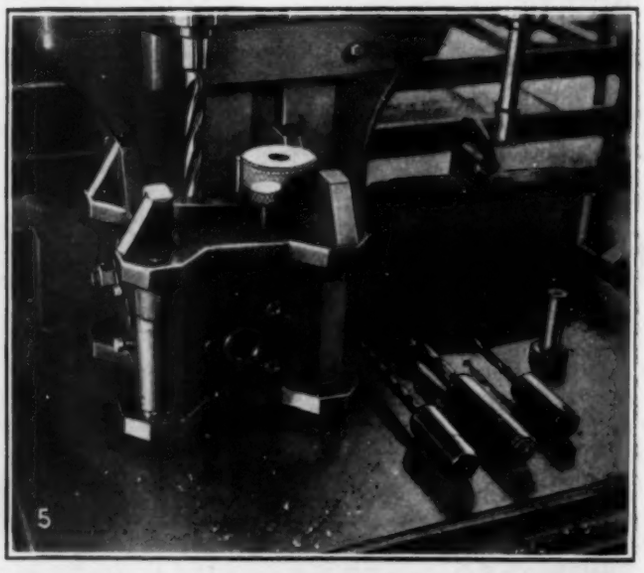
Three sizes of cylinders, run through in quantity lots, are handled in the machines, all of which require chucks and tooling to suit. The work is then held on a mandrel in a lathe and is finish faced on the flange, and turned on the pilot end to 2.187±0.001 in. The flange face is located from the port cores so the ports, which are gaged from the flange, will clean up. A snap gage is used to check the pilot diameter. From here, the cylinder goes to the multi-spindle drill, Fig. 4, where fourteen various sized holes are drilled for the flange joint, gas-tank support, exhaust manifold and water inlet. The work is located

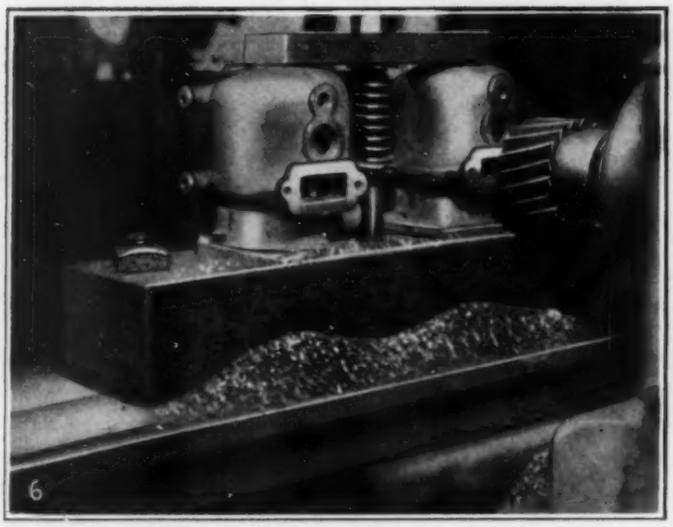
Automotive Production











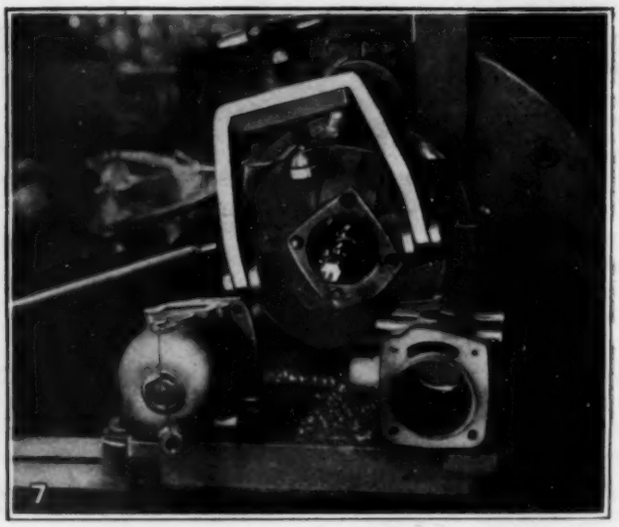
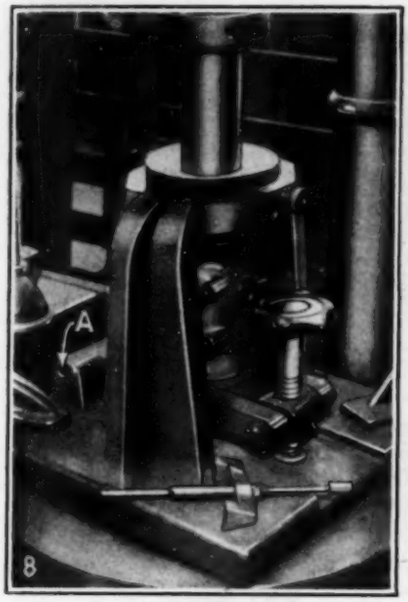


Fig. 2—Water test for rough castings. Fig. 3—Boring, facing and turning open end. Fig. 4—Jig for drilling a number of small holes. Fig. 5—Jig for drilling and counterboring. Fig. 6—Milling exhaust pads. Fig. 7—Indexing fixture for milling ports

Automotive Production



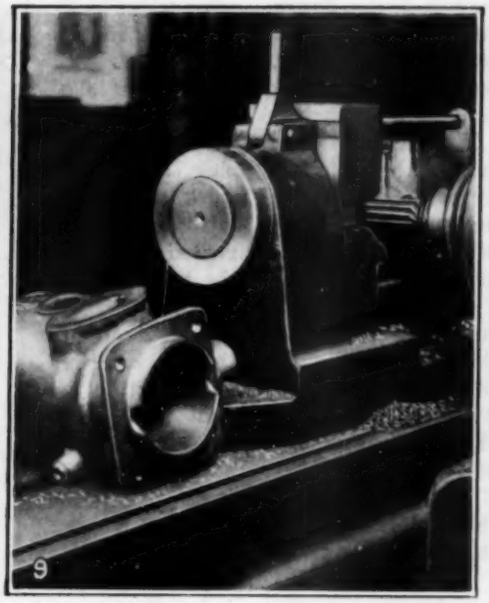


Fig. 8—Fixture for machining dome. Fig. 9—Milling connecting rod clearance on pilot
Fig. 10—Tapping spark-plug holes

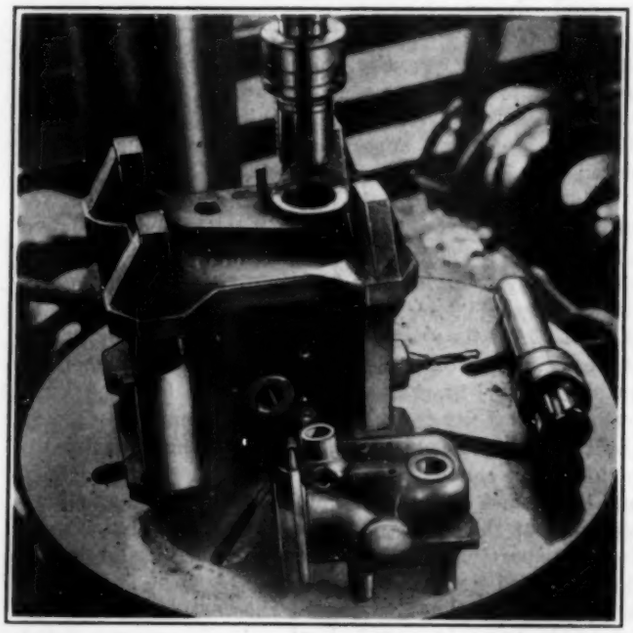


Fig. 11—Spotfacing and hollow-milling carburetor boss

in a roll-over jig by the large bore and is clamped by a leaf that is locked by a swinging eyebolt. A rough casting is shown to the left while a finished piece is seen at the right. The operation is handled on a Natco drilling machine equipped with a Natco drill head.

A similar jig is used for drilling the spark-plug hole, two holes for water outlet, the hole for the carbureter mounting, and for counterboring three holes for core plugs. This operation is accomplished on a two-spindle Simplex drill. One operator handles both drilling operations in 2½ min., floor-to-floor time.

The next operation is the milling of the exhaust pad and the supports for the gas tank. This operation is performed in the Brown & Sharpe milling machine illustrated in Fig. 6. A fixture locates two cylinders by plugs that fit the bores and by locating pins in one of the flange holes in each cylinder. After one side has been machined, the cylinders are turned 180 deg. for milling the opposite faces. The swinging strap clamp is arranged to hold both cylinders. The end-mill runs at 300 r.p.m., and the feed is 12 in. per min. Approximately ⅛ in. of metal is removed, the operation being completed in 2½ minutes.

Exhaust and intake ports are milled in the Pratt & Whitney hand-miller shown in Fig. 7. The cylinder is located in the indexing fixture by its pilot end. A locating plug fitting into one of the flange holes, seats the work radially. The swinging clamp is swung down in a horizontal position and the hand-screw tightened, holding the work securely. In this position the cutter is inside the cylinder bore and in line with the corresponding ports. When the table is raised, the port under the cutter is machined to size. The fixture is provided with an indexing plug and is indexed to four locations to complete the ports. The cylinder dome is machined in the Sibley drill press, Fig. 8, utilizing a fix-

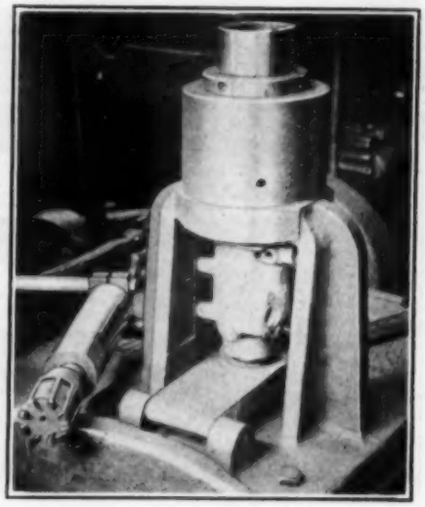


Fig. 12—Hand-reaming fixture

Automotive Production

ture in which the work is located against the flange face. The clamp is hung on the pivot *A* and is brought against the work by the hand screw shown at the right. To release the work the screw is loosened and swung forward, allowing the clamp to fall a distance sufficient to permit the removal of the work. The doming tool is constructed so the body, fitting the cylinder bore closely, remains stationary while the cutting tool, mounted on the end, revolves. The depth is indicated by a scale on the quill of the machine, and the size is checked by the depth gage shown on the fixture. Approximately 20 sec. is required for the operation.

Following this operation, the connecting rod clearances in the pilot are milled in the Brown & Sharpe machine shown in Fig. 9, using an indexing figure that presents the work to the cutter in two positions so the opposite sides can be machined. The end mill runs at 600 r.p.m., and the work is fed to it by hand. The indexing pin is located on the top of the fixture. A finished cylinder is shown on the machine table.

The spark-plug hole is spotfaced to 1 in. in diameter,

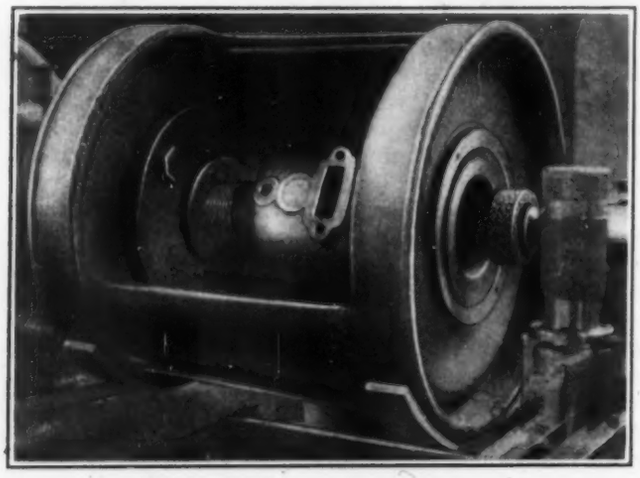


Fig. 13—Fixture for grinding bore

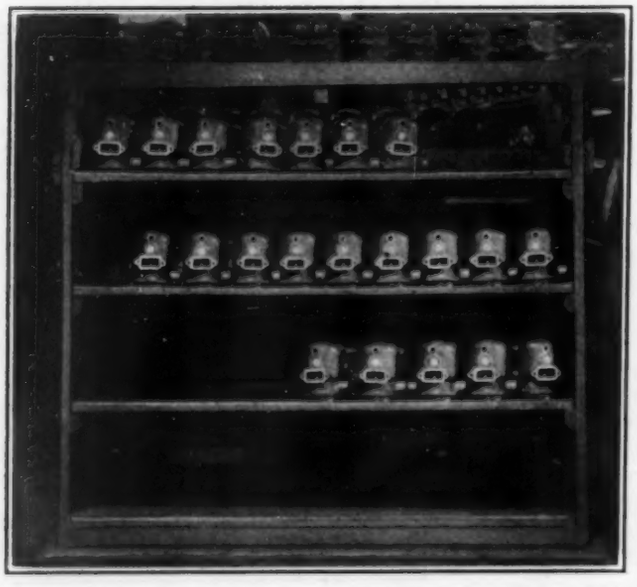


Fig. 14—Truck for transporting material

after which it is tapped as shown in Fig. 10. An angle-plate fixture, provided with a locating plug, aligns the work while the tap is being passed through the hole. Oil is brushed on the tap as it enters the work. Fig. 11 shows the jig and tools used for spotfacing and hollow milling the carbureter boss. The operation is handled in a Sibley drilling machine. The cylinder is next mounted in a simple fixture and all other holes are tapped.

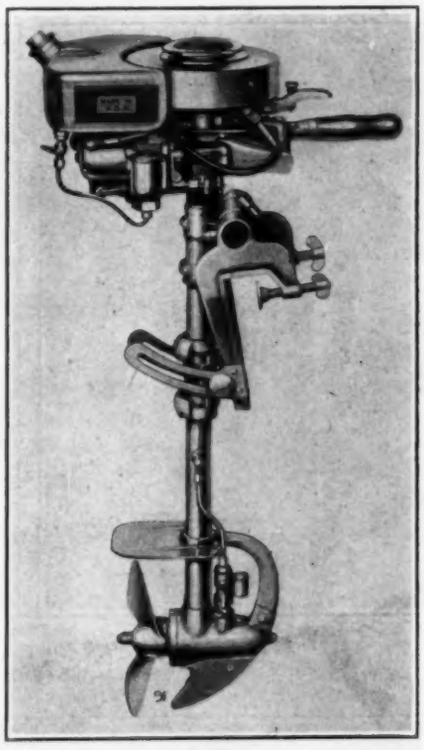


Fig. 15—The complete motor

A second water test is made at this stage, after which the work is cleaned, snag ground, scratch brushed, and plated with both copper and Utelite.

Prior to grinding, a hand-reaming operation is required, in which the work is placed in the fixture shown in Fig. 12, the clamping being similar to that shown in Fig. 8. Approximately 0.01 in. is removed, bringing the bore to 1.992 in. The reamer used can be seen at the left of the fixture. The final operation is the grinding of the bore on a Heald internal grinding machine, as shown in Fig. 13. The cylinder is clamped by a push bar that fits through the machine spindle, forcing the flange of the work against a locating ring on the inside of the chuck. The bore is finished to 2 in.$\pm$0.0005 and is checked by the Bath micrometer plug-gage shown standing at the right. The upper part of a hand truck for transporting work between operations and in the finished condition, is shown in Fig. 14. The shelves are sloped at an angle of 10 deg. so the castings cannot fall off as the truck is moved about.

The completed motor is shown in Fig. 15, ready to be attached to a boat.

Fits required in the piston pins and crankshaft bearings of gasoline motors differ very much from the fits of the same parts on steam locomotives. Railroad shop men on roads using gasoline cars will have to revise their allowances for these fits.

A recent report of contract air mail operations on the Pacific Coast shows that the average speed was 102 m.p.h. and that the fuel consumption averaged 10 miles per gallon. The oil used was 1.9 qt. per hr. or about 215 miles per gallon.

Book Reviews

Engineering Metallurgy. A Textbook for Users of Metals. By Bradley Stoughton and Allison Butts. Four hundred and forty-one pages, 6x9 in. Illustrated. Published by McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City. Price $4.

Primarily a textbook on metallurgy for engineering students this volume will also be useful to the engineer in industry whose grounding in metallurgy is inadequate. It is designed more for the man who uses metal than for the one who extracts or refines it.

Beginning with an account of the structure of metals the authors continue through their inspection and testing to a brief statement of how they occur in nature and how they are obtained and refined. Next comes a chapter on the various means of adapting metals to engineering use, including casting, die-casting, extrusion, rolling, forging, cutting, welding etc. This is followed by a discussion of alloys.

The next two chapters are devoted to the ferrous metals and the one following these to non-ferrous metals. The remaining chapters deal with corrosion and its prevention, fuels and combustion, metallurgical slags, fluxes and refractories, pyrometry and heat transfer. Each chapter includes a bibliography and there is an index at the end of the book.

Much of the material is of necessity elementary and some of the illustrations are not as recent as they might be but, on the whole, the authors have accomplished satisfactorily what they set out to do.

Die Satzrädersysteme der Evolventenverzahnung. By Dr. Paul Kruger. Ninety 6¼x9¼-in. pages, paper covers, 30 illustrations, indexed. Published by the Verlag von Julius Springer, Berlin, Germany. Price 8.40 marks.

This booklet is an exhaustive mathematical treatise on the general principles of the involute gear in its various applications. The book is intended to be of a practical nature to meet the needs of the average designer, but much of the calculation is necessarily involved due to the present high standard of requirements for gear teeth.

The booklet is divided into three chapters, subdivided into numerous sections treating of the various phases of the subject. The first chapter takes up the principles of gearing, and the tooth formation under the involute system. The other two chapters treat of the involute gear system in its various relations to tooth height, form, and action. The booklet is a timely addition to a subject that is attracting considerable interest at the present time.

A.S.T.M. Tentative Standards, 1926. Eleven hundred pages, 6x9 in., cloth or paper covers. Indexed. Published by the American Society for Testing Materials, 1315 Spruce St., Philadelphia, Pa. Prices to non-members, $7.50 paper, $8.50 cloth.

Each year the Society publishes collectively the tentative specifications, methods of test, definition of terms, and recommended practices in effect September 1 of that year. This volume for 1926 contains 227 such tentative standards. The purpose of the publication is to elicit criticism and discussion before final acceptance is given to any of the proposed standards.

The contents are classified under the general headings: ferrous metals; non-ferrous metals; cement, lime, gypsum, and clay products; and miscellaneous materials, such as preservative coatings, petroleum products, road materials, coal, coke, timber, shipping containers, waterproofing materials, slate, insulating materials, rubber products, and textile materials. A number of tentative revisions of A.S.T.M. standards are also appended.

Elementary Mechanism. By A. T. Woods and A. W. Stahl, revised and rewritten by Philip K. Slaymaker. Two hundred forty-five pages, 6x9 in., clothboard cover. Published by D. Van Nostrand Co., 8 Warren St., New York, N. Y. Price, $3.

Mechanisms, relating to the transmission and the modification of motions as applied in the design of machines, are treated in this volume which is intended primarily as a text book. The addition of new material, gathered from many sources and covering the introduction of modern applications, together with considerable revision of the original text, has been undertaken in order to offer a more logical presentation of mechanisms. A new chapter on the subject of instant centers deals with rolling circles, the location of axes and common velocity points. In revising the section devoted to gears and gear teeth, much consideration has been given the involute system. Throughout the volume, an aim has been made to present the examples and their descriptions accurately, clearly and precisely.

The contents include the communication of motion by linkwork, wrapping connectors, rolling contacts, sliding contacts and trains of gears. Motions that can be produced and forces that can be delivered in relation to the source of power and the object to be accomplished are shown graphically by 248 illustrations.

Proceedings of the Industrial Accident Prevention Conference. This booklet is Bulletin No. 428 of the Bureau of Labor Statistics. It contains one hundred seventy-six 5¾x9-in. pages, paper bound. It is a complete record of the transactions of the conference held at Washington July 14 to 16, 1926. The papers read before the conference, together with the discussions, which are contained in the booklet, form a useful compilation of information on accident prevention, accident statistics, and casualty insurance. The book can be obtained from the Superintendent of Documents, Government Printing Office, Washington, at the price of 30 cents.

Annual Report of the Director of the Bureau of Standards, Fiscal Year Ending June 30, 1926. Fifty pages, 5¾x9 in., paper covers. This booklet gives a brief outline of the work accomplished by the United States Bureau of Standards during the year. That the Bureau is covering a wide field of usefulness in testing, co-ordinating, and standardizing information valuable for industry is evidenced in this brief summary of the work done. Of particular interest to the machine shop executive is the work being undertaken on the testing of engineering materials, standardizing mechanical appliances, gage standardization, research on steels and the corrosion of metals, and the co-ordination work on industrial standards. The book is sold for 5 cents by the Superintendent of Documents, Government Printing Office, Washington.

THE · FOREMAN'S · ROUND · TABLE

Which Kind of Man Is More Valuable?

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions at the foot of the page have been prepared

"CAST your eye over this letter, Ed! Just got it from an old friend of mine who's foreman in a big railroad shop. He's some live wire, too. What sort of comeback do you get from it?" And Al passed over the letter that follows:

"Dear Al:

I have two men in my department, both excellent machine operators. Number one would walk the whole length of the shop to call my attention to a small blow hole, sandy spot or incipient crack in a casting. Hunt me up at any time to tell me he was afraid 'that casting I am working on will not quite clean up in one spot.' Stop me when going by his machine to tell me 'this is a harder casting than the last one etc.' Yet for all that, he turns out satisfactory work.

Number two is also a fast worker but the following incident is characteristic of him:

The works manager, in passing his boring mill, noticed an extra heavy cut being taken off a large cylinder bushing and the following dialogue took place:

'Why are you taking so much metal off that casting?'

'I don't know, I'm making it to the blueprint.'

'Are you sure you have the correct blueprint?'

'No, I'm not sure, but it is the one my foreman handed me and told me to work to it.'

'Well, have you the proper casting for that size cylinder?'

'I don't know. It is the one that was delivered to my machine.'

'Have you ever machined any similar ones having as much excess metal to remove?'

'No, I have not.'

'Do you machine all the large bushings used?'

'Yes sir, I do.'

'Then does it not occur to you that something is wrong?'

'Well, if there is anything wrong, it is not with me. I always do as I am told.'

"Just at this time I came along and in a few words explained that we could not wait for the delayed shipment of castings and this was substituted rather than delay a much needed locomotive, although it belonged to another class of cylinder.

"Which of the two men would be considered the more valuable?"

"What's the answer, Ed?"

"Well, Al, I don't fancy the nosey chap who seems to be always trying to stand in with the boss."

"Neither do I, Ed—but isn't he a better man for the shop than the guy who doesn't care what happens to the work so long as he can hand the responsibility on to the foreman?"

Is the man who hunts up the foreman trying to "stand in" or is it genuine interest in the work.

Is the man who obeys orders blindly without thinking or caring as to the result, a desirable man.

Which type of man helps to earn most for the shop.

All foremen are urged to discuss these questions. Acceptable letters will be paid for. The discussion is not limited to foremen, of course

Discussion of Earlier Topics

Saving a Man's Face

AL IS right about saving a man's face, provided the man is of the "Grade A" class in regard to the quality of his work, his steadiness and general efficiency. There is a decided knack required in the man who would effectively handle men. Successful foremen, superintendents, managers and executives possess it either inherently or acquired. But no blanket rule, which is evidently the system Ed uses, can be applied indiscriminately, There arise cases where harsh words may seem the only way but these cases are usually new men afflicted with stupidness or plain laziness. This type of man should be quickly weeded out by the foreman.

If Bill Jones' work is of a high class, Al shows true executive ability in his effort to arrive at the best method to induce Jones to adhere to the rules of discipline and to still retain his efficiency. Top-notch men realize the superiority of their work over that of mediocre men and consequently develop a sense of independence and desire more freedom and privileges. This is decidedly a natural law of psychology and it applies to leaders in whatever field of endeavor they may be connected with.

This type of man is exceedingly difficult to handle and requires a thorough understanding, broad common sense and tact to turn the trick. Which kind do you prefer in your department, men who adhere to rule and discipline, timid men who are but 40 per cent efficient, or the 100 per cent man who sometimes steps on your dignity and punches the clock a few minutes late occasionally? Consider well, for you are not selling dignity, pride, authority, discipline, but a quality product efficiently produced by high-grade men, men who are hard to handle but worth handling.—W. F. HAGNER.

THE · NEXT · TOPIC

Taking Care of the Old Men.

QUESTIONS

Should men who have begun to slow down be let go?

Or should they be pensioned?

Is it wise to make watchmen or sweepers out of them?

What other solution of the problem is there?

Who Should Boss the Move Men?

IN THESE days of close competition the more savings a shop can make, the more certain it will be to continue successful. By placing all move men under one boss the foreman's overhead will be reduced since several men will probably be eliminated.

Ed's dignity will not suffer under the new arrangement for he already has to phone for emergency men at times. He would not want the constant expense of having a belt man hang around his department all day. The move man will be frequently idle if he has to take care of but one department.

A separate transportation crew should be able to move things as fast as a departmental move man. If a department has very many parts to move, the boss move man can send two or three trucks to do the job and accomplish it much faster than could the departmental move man with but one truck to do the transportation. —JOS. E. ABBAZIA, *Mech. Instr.*

Saving a Man's Face

BY IMAGINING ourselves in the other fellow's place, we can readily understand that it is always a good plan to avoid hurting a workman's feelings, if possible. Many a man only needs to know that his defects of conduct or skill are noticed and that improvement is expected. If "suggestions" are offered in a helpful way, he is quick to see the point and will be careful not to jeopardize his job or chances for future advancement. Of course, this method will cause some individuals to think that the boss is "easy going" and they are quick to take advantage of him. In such cases the foreman must be a bit more forceful and, perhaps, aggressive.

It is often a good thing to hurt a man's feelings or to wound his pride a bit and, if there is opportunity later for the foreman to express appreciation for even slight improvement, the workman will understand that no hard feelings exist and that he stands well with the foreman as long as he does his part.

It is seldom wise to adopt a threatening attitude although some things may be said as a promise rather than a threat. The foreman must realize when to stop talking and to start acting. To summarily discharge a man, as in case of insubordination, may at times be most effective as an example for others. If a foreman is kind but firm and is known as a "square shooter" he may be a strict disciplinarian and still hold for himself and the company the loyalty and respect of his men. The writer has in mind a man who was a hard taskmaster and who was unusually strict as a disciplinarian, whose spirit of fairness and willingness to recognize ability, however, won for him an enviable reputation with both his men and his employers.—R. A. BOLEY.

Saving a Man's Face

SARCASM and ridicule may possibly be useful in calling a man down in very rare instances, but only sufficiently so to prove the rule that their use is a confession of the weakness of the position and viewpoint of the foreman or the superintendent resorting to it. The foreman who resorts to such tactics is taking unfair advantage of the man who dares not come back at

THE · FOREMAN'S · ROUND · TABLE

him. Sarcasm and ridicule prove nothing. They leave the victim sullen and resentful and open up the way to underhanded retalitation. How much better, fairer and more permanent it is to come out and put your cards all on the table, telling the mechanic logically, calmly and directly why and how he has fallen down and giving him a similar chance to defend himself.

Breaches of discipline should never be overlooked merely because the resulting grouch will cut a man's efficiency. On that basis, the pleasant willing worker would get more than his share. Generally speaking, a man who can't take it when it is coming to him, no matter how skillful he is with his tools, is a poor man to have in an organization.

To never bawl a man out publicly is a mighty good axiom to follow. It may be unconscious but in most instances the man who does it is talking for the benefit of the audience rather than for the good of the organization or of the offender. It is much better to talk it over quietly. Don't forget that none of us is 100 per cent right and the foreman who is once shown up before his own "audience" suffers more in loss of prestige than he could ever hope to gain in years of this unsportsmanlike practice.—STANLEY J. GUSTOF.

Saving a Man's Face

I BELIEVE that Al is right in trying to avoid hurting Bill Jones' feelings by not bawling him out before the other men. A foreman's motto in dealing with a man should be to treat him as he would wish to be treated if he were in the man's place.

If Bill Jones has a habit of being late or does too accurate a job when a rough job will answer the purpose, the foreman can arrange to have a man to man talk with him in case he is otherwise a good and reliable workman who would be hard to replace. By the use of diplomacy he can make Bill Jones see the error of his ways. If Jones does not correct them, the foreman's next move is to quietly discharge him. Should Jones be feeling a little grouchy, rough handling by the foreman may react sufficiently violently to provide a little vaudeville sketch for the other workmen.

Tongue lashings usually leave a sore feeling upon the victim who will have to stand considerable "kidding" from the other men. Production will suffer also until things settle down again.—WILLIAM E. KELVIE, *Engineer.*

Who Should Boss the Move Men?

A LOW overhead is often the foundation of a successful business. Reduce the overhead by putting transportation under the direction of one man and apportion this labor expense to the different departments rather than have numerous trucks filled to only half their capacity being pushed around from one department to another.

The dignity of many a foreman is his real downfall. He thinks more about his elevation above his associates than about the duties that are allotted to him as a foreman. Dignity should not enter into the transportation question. A well-managed department will soon be able to change over from driblet deliveries to the more economic method by proper co-operation.

Is it not a fact that a successful foreman should have ample to do to occupy his mind in looking after production, studying improved conditions and preparing his product for the associated department without having to pay attention to the delivery of the product after it is finished? A foreman who has his "dignity" hurt by labor and overhead savings is not suited for a position commanding respect. Let Mr. Foreman leave his so-called "dignity" at home for a few days and watch the final result not only on his department but on himself. —H. E. FISHER.

Saving a Man's Face

THE psychology of good foremanship today does not call for a bawling out whenever the workman has apparently earned one. In days gone by it was customary for a foreman to let the gang know who was the boss by swearing and threatening in a high-handed manner. The modern foreman is a good leader of men and is much more of a gentleman. He is the boss of his gang at all times but none of his men feel as if they were "under dogs."

The only cases where a bawling out is the proper course is when the same offence is repeated several times. Even here it is best to do the job beyond the hearing of the rest of the gang. A good way to make a bawling out effective is to follow it up with a two- or three-day layoff so that the man can think it over.

The foreman is the representative of the company for which he works. If he makes himself disliked the workmen are bound to be indifferent and to do poor work. A good foreman must always be an example of loyalty to his company and a leader of men. In order to be this, the foreman must have his men with him and he cannot succeed if he is of the type too willing to create a scene.—LAWRENCE F. SWENSON, *Standards Engineer.*

Who Should Boss the Move Men?

AL IS right when he says that dividends are the main thing. A shop that doesn't pay dividends usually doesn't stay in business long. By putting transportation under one head the work will be speeded up and there will be a saving in labor also.

How does Ed figure that his dignity is going to suffer? He doesn't object to calling a millwright, beltman, or any other emergency man, does he? Ed will find that under the new system, things will move faster and that he will be better satisfied when he finds out that he doesn't have to be making up jobs to give to his truckman who is now idle about half the time.—THOMAS M. GARRY, *Foreman.*

THE · FOREMAN'S · ROUND · TABLE

Saving a Man's Face

A FOREMAN must use tact in dealing with his men, especially a man of Bill's type when he is so valuable to the company. If Bill is rebuked before his fellow employees he will be angry and resentful, and his coworkers are likely to twit him on the "bawling out" that he received in their hearing. This is too likely to foster a "don't-care,-the-foreman-is-down-on-me-anyway" spirit.

When dealing with Bill's continual lateness, the foreman can take him aside and point out to him that it is not fair to the others who get in on time to have one of their number a habitual laggard. He can tell Bill that the others look up to him, take him as an example and conduct themselves according to the way be conducts himself, and that if he is habitually late and gets away with it they will expect to do likewise. Bill will then be more likely to see the justice of the foreman's kindly remonstrance and to see that the example he sets will be a good one. It is the exception when a man will not respond to kindly treatment. The same treatment would be advisable in the case of Bill's being too "fussy" with some of his jobs. Many a man is gently led where he could not be driven.—V. E. ATWELL.

Saving a Man's Face

THE practice of jumping into a man and bawling him out is the method of the antiquated "hard-boiled" type of foreman who never knew that a machinist was a human being just like himself. There is still considerable of the boy in every man and this "boy" part of the man will always resent being scolded.

A foreman should never aim to hurt a man's feelings except when the man cannot be made to see the light in any other way. The foreman's first problem is to study his men and to make himself acquainted with their home relations and difficulties. Sometimes it is a man's home difficulties that cause him to be negligent in the shop. In such cases a man can often be corrected without his realizing its being a correction. Only the willfully negligent deserve drastic treatment and even that can be given in a gentlemanly way. The foreman must be firm but at the same time considerate. The man who won't respond to such treatment had better be cut loose from the organization.—ARTHUR MUMPER, *Foreman.*

Saving a Man's Face

THE only way to cure a man of dragging in late or of being too fussy with rough jobs is by example and persuasion. If this has no effect, get rid of the man with a few words as to your reason for doing so. I have had 25 years of experience as a machine shop foreman and I have never talked harsh to my men. When I want a micrometer fit I tell him so and the nearest neighbor doesn't know whether I am complimenting him or reprimanding him. I have never lost a man unless he was bettering himself through the change of positions and my men know that although I am their boss, I am also their friend. We are all human and prone to err. The only successful way to lead men is to appeal to the best that is in them and to set a good example yourself. Hurting a man's feelings won't reform him. It is more likely to work harm. The foreman has two eyes while twenty-four workmen under him have forty-eight eyes.—C. H. FUIK, *Foreman.*

Saving a Man's Face

THE problem of "Saving a Man's Face," is perhaps best answered by a little dialogue which took place recently at the Steel Treaters' Convention and Machinery Exhibit, Chicago, in front of a fine display of machine tools.

"Why, hello, Mr. Brown! I haven't seen you since 1907 when I left your employ. Don't remember me, eh? Well, I'm Pete ....., who used to run a lathe for you in the old C. V. Railway Shops. Are you still superintendent there?"

"Oh! yes, I can see you now. I remember you quite well. You looked much younger at that time. What are you doing new?"

"Well, I am factory manager of the ..... Machine Co. and we are doing a fine business, too. This is our exhibit. You know I'm glad I met you for I've long wanted to remind you that you once gave me the worst and most effective bawling out a man ever got and did it in such a nice smooth manner, as to make me call myself everything I could think of all the rest of that day."

"Well, that is interesting!"

"Yes, you came up to me while I was running a lathe turning heavy crankpins and said Pete, I've always admired the way you grind your tools. They take heavy cuts which curl away in a manner indicating they are ground just right and by a man who knows how.

"This, of course, made me feel good. Then you asked what is the best speed you find those high speed steel tools will stand up at. I replied that they should stand up to 60 ft. per minute.

"Is that so? What are they doing now?"

"Oh, about that."

"Well, we won't put a meter on it, but the pin is 7 in. diameter and let's see, it is making about 15 revolutions per minute. That is a little less than 2 ft. per revolution. Will call it 2 ft. You're running about 30 ft., but then I guess that's pretty hard stuff, isn't it? For I know a lathe hand with your reputation would run more than 30 ft. per minute if everything was all right."

Then you walked away and that was the turning point in my life, Mr. Brown. I left you shortly after that but have never forgotten that quiet little bawling out and it certainly taught me a lesson that has meant a great deal to me, while getting to where I am now."
—BILL BROWN.

Ideas from Practical Men

The department, "Ideas from Practical Men," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from five dollars upward, according to their merit

Press Tools for Clutch Disks

BY LOUIS L. LOCKE

The clutch disk shown in Fig. 1, made of 0.72-in. cold-rolled sheet steel, half hard, is made in three operations. The blank is cut from a strip, 10 in. in width. Following this operation twelve 0.166-in. holes, equally spaced on a 7⅛-in. radius, are pierced as shown. Forming the five tongues is the final operation. The die-shoe assemblies for the three operations are similar in construction, having four guide pins in the die-shoe, and bushings to correspond in the punch holder. In Fig. 2 are shown constructional details of the blanking die. The blank is cut from the strip and forced downward through the die by the punch *A*. The die is made in two sections. The smaller section *B* is a solid block and fits a counterbore in the die-shoe. The ring portion *C* is fitted to the die-shoe in a similar manner. A pressure pad, located between the die sections, is supported and operated by four pressure pins. Two stripper plates are operated in connection with the punch, one being located on the outside of the cutting edge, the other on the inside. Helical springs furnish stripping pressure for the plates.

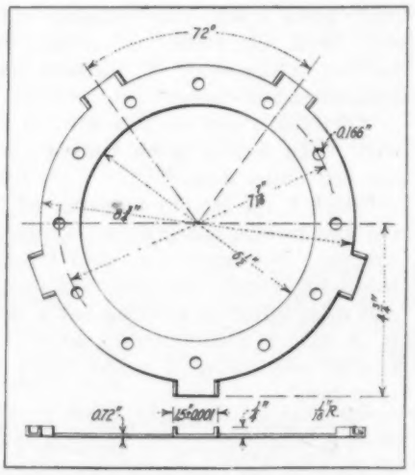


Fig. 1—Details of clutch disk

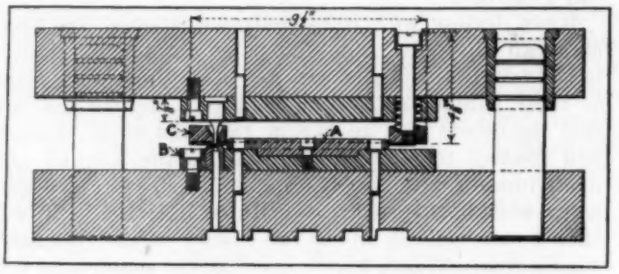


Fig. 3—Details of piercing die for 12 holes

The die for piercing the twelve holes in the disk is illustrated in Fig. 3. The plate *A* locates the work centrally. Radial alignment is attained by two pins located in the die pad *B*, and so spaced that they

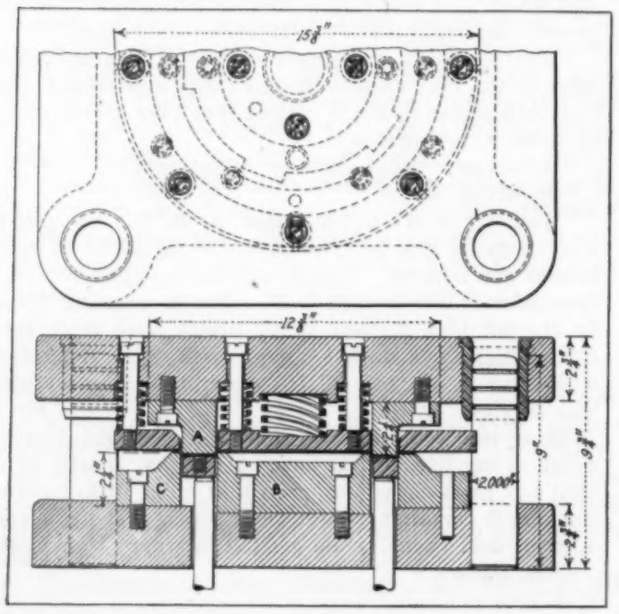


Fig. 2—Die that blanks disk and pierces center hole

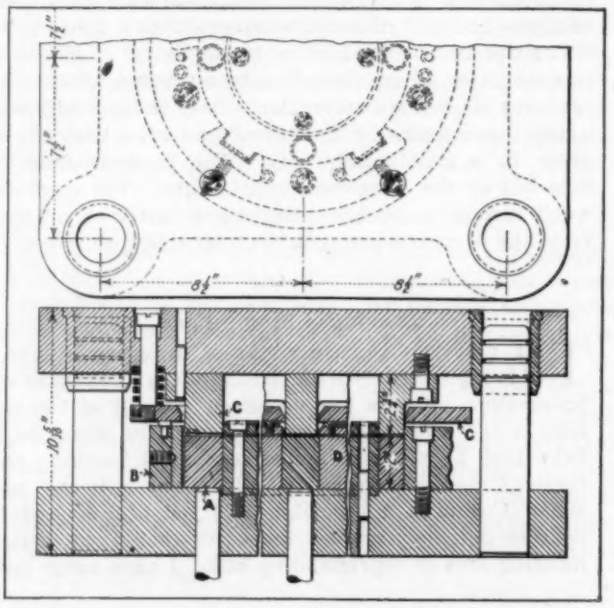


Fig. 4—Constructional details of forming die

straddle one of the tongues in the disk. The disk rests on die buttons mounted in the die pad. The punches are located in a punch-pad, which, in turn, is fastened to the punch-holder. The stripper plate *C* ejects the work from the punches on the upward stroke of the press.

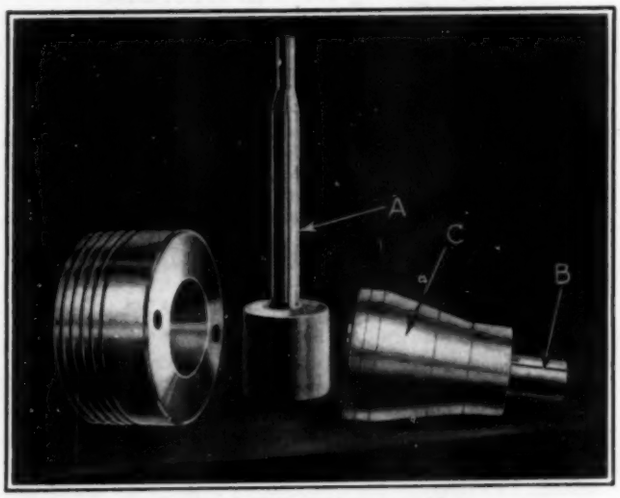
Forming the tongues by turning up the edges is the final operation. Constructional details of the die for this operation are illustrated in Fig. 4. The disk rests on the pressure pad *A*. and on the die-block *B*, the latter having five sets of nest plates from which radial location of the work is maintained. The die-block is equipped with hardened inserts for forming the tongues, in connection with five punches as shown at *B*. The stripper plate *C*, surrounding the punches, ejects the work. The center portion of the die at *D* is cut away to show the construction of one of the punch, die and nest assemblies.

A Stub Mandrel

BY E. V. ALLEN

Stub mandrels, used to hold work like gear blanks, heavy nuts, collars and the like while facing them after they are bored, are made in various forms. The one here shown is a little different from any other that I have seen so far.

The main body of the mandrel is made to fit the spindle of a large turret lathe, into which it is screwed by means of a spanner wrench. The expander, *A*, is made so that the large end will fit into the bore of the



Stub mandrel, disassembled

spindle and rest against the end of the regular chuck quill. The small end is tapered to fit into a tapered hole in the split stub *B*. This stub is part of a shouldered tube which is forced into the plug *C* from the rear.

In assembling the parts on the spindle end the expander *A* is first slipped, large end first, into the spindle. Next the two-part plug *C* is slipped on over the projecting tapered end of *A*, and then the main body, or cap, is put on over the plug and screwed tight.

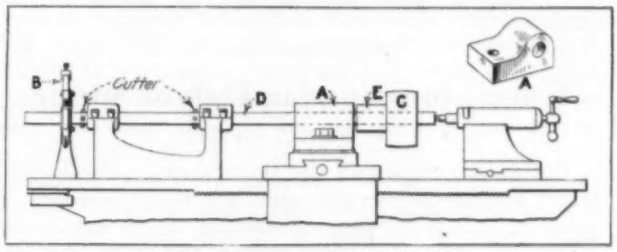
As the plug is a taper fit in the screw cap, it is held securely, since its large end rests against the outer end of the machine spindle. A coil spring, not shown, is used inside the plug *C* to force the plunger back when released by the chucking quill. This allows the work to be removed from the mandrel easily.

Reboring the Spindle Bearings of a Lathe —Discussion

BY CHARLES KUGLER

The article by Robert R. Durfield, Jr., under the title given above, and published on page 720, Vol. 65, of the *American Machinist*, reminds me of a similar job that was done in a mill in my home city some years ago.

The casting shown at *A* was the only extra part needed. It was attached to the cross-slide of the lathe and bored in place before the headstock was stripped.



Boring the headstock of a lathe

The steadyrest *B* was also adjusted to the centerline of the lathe before the work was begun.

Pulley *C* was splined to the bar *D*, on which it was fitted to slide. The collar at *E* kept it from moving along with the bar. The feed was applied by means of the regular tailspindle.

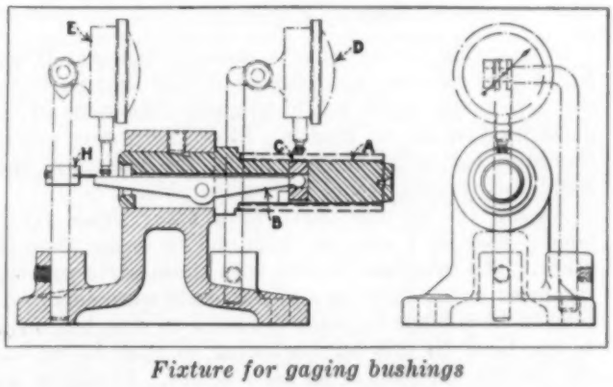
Power was transmitted to the pulley by belt from a temporary pulley on the overhead countershaft. Two cutters were used in the bar.

A Bench Gaging Fixture

BY ROBERT W. HAGGAR

The fixture shown in the illustration was designed for testing the concentricity and parallelism of bushings in which great precision is required. The body of the fixture is an iron casting bored to receive the arbor *A*. The actuating lever *B* is located in a slot in the arbor and is pivoted in the approximate center. One end of the lever is machined to a spherical shape and is hardened and polished. This end is fitted to a hole in the plunger *C* which latter is directly under the stem of the dial indicator *D*, but is not in immediate contact with it.

The opposite end of the lever protrudes from the rear of the arbor and is in contact with the stem of the indicator *E*. A small flat spring in the adjustable collar *H* keeps the end depressed enough to insure that the



Fixture for gaging bushings

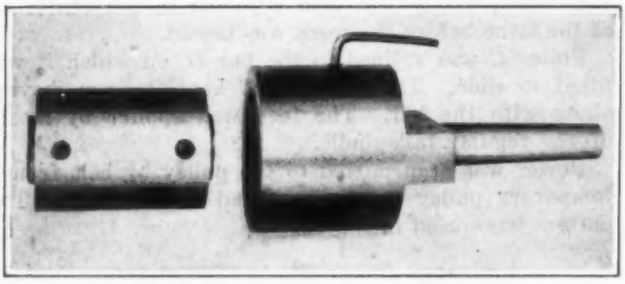
plunger *C* will always contact with the bores of bushings placed on the arbor.

In operation, if a bushing is placed on the arbor and rotated, any eccentricity between the hole and the outside, or any difference in wall thickness, will be shown by the indicator *D*. By moving the bushing lengthwise on the arbor and rotating it in different positions, the exact location of any irregularity can be determined. The test also shows whether or not the hole is in axial alignment with the outside. During these tests, if the hole in the bushing is oval, or is either bell mouthed or bell centered, such defects will be shown by the indicator *E*.

Fixture for Squaring Ends of Springs

By Wm. C. Landis

The fixture shown in the illustration is for holding coiled springs while the ends are being squared by grinding. The springs are held by a gib key in the removable collet *A*. When loaded, the collet is placed in the chuck *B* which is held in the work spindle of a



Fixture for grinding spring ends

universal grinding machine. The work head is set at a right angle to the wheel spindle, so that the grinding is done by the periphery of the wheel.

After one end of the spring has been ground, the collet is removed from the chuck, turned end for end and replaced, bringing the opposite end of the spring in position to be ground.

In the case of springs made of 0.281-in. wire, and having a diameter of 1$\frac{13}{16}$ in., both ends can be ground square with the axis, within $\frac{1}{64}$ in. in the length of the spring.

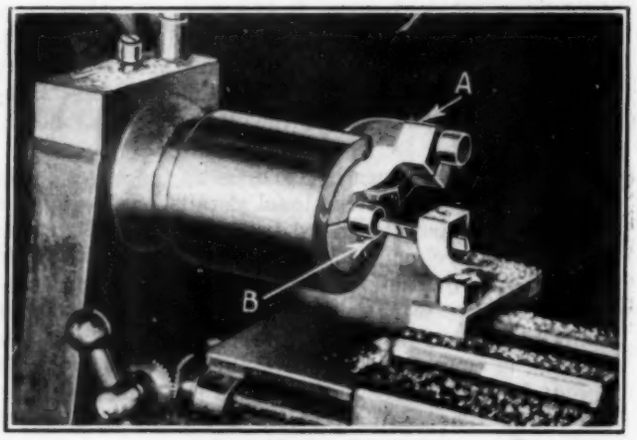
We had tried several methods for grinding springs, but had poor success until the fixture shown was made.

Boring the Ends of Return Bends

By V. A. Emmons

In changing the model of a radio loudspeaker it was found that someone had blundered, and that parts for the new model would not fit properly into some of the parts used on the old models. Since there were several thousand old parts already made, the waste, if they could not be used, would be considerable.

Among the off-size parts were many brass return bends—that is: U-shaped—with one leg longer than the other. The principal trouble with these parts was that the holes in the short legs of the bends were small. Attempts were made to ream the holes to size, but owing to the bend on this leg beginning so close to the end, the results were not at all satisfactory. Finally it was



Rig to bore return bends

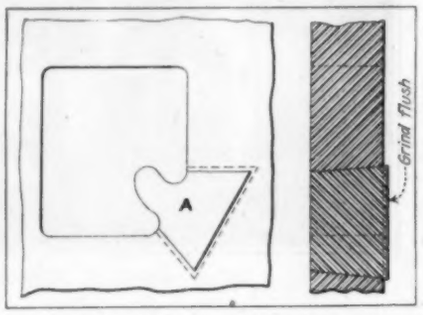
decided to bore out the ends in a small lathe, and the chucking arrangement here shown was made.

This arrangement consists of a draw-in chuck with a three-jaw spring collet acting in the usual manner, but with two of the jaws having projections on them to extend beyond the chuck cap far enough to hold the long leg of the piece as shown at *A*. The chuck cap and collet were cut away just back of the projecting jaws to allow the bent tube to be inserted and the short leg thrust out as shown at *B*. Held in this way, it was easy to bore out the end to the size desired.

Designing Dies to Decrease Maintenance Cost

By Lloyd L. Lee

While there are numbers of different methods of punch and die construction, in but few of them is the maintenance item given enough consideration. Where a large number of parts are to be made this is very important, both because of loss of production while the tool is in the toolroom undergoing repairs, and because of the actual cost of the repairs. One method of constructing blanking dies, which I have found to save considerable on replacements, is the use of a "dutchman" or inserted piece *A*. While the first cost is a little more than if the projection was integral with the die, the saving in the long run readily justifies it. The sketch shows an application that can be used advantageously.



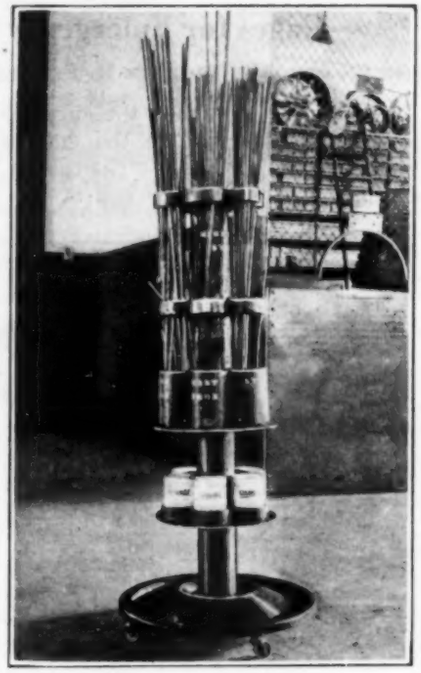
Die with inserted piece

In a solid die, the little neck is hard to support and is very apt to be broken off, ruining the entire die, but the insert shown can be easily replaced at a fraction of the cost of a new die, especially if the die is a progressive one to be used with several piercing punches. The insert should be made slightly thicker than the die and the projection should be ground off flush after it has been forced in.

A Handy Rack for the Welder

By Ernest L. Lucas

Most every welder likes his stock and his flux cans handy and in order. The illustration shows a neat, portable rack built from scrap boiler tube, boiler plate, a discarded disk wheel and four metal casters. By use of this rack the welder has each kind of filler rod and flux in a separate holder always handy. The rack is easily constructed, since tack welds only are used on all joints. It is portable, attractive, and will prevent cluttering up the welding table with rods and flux. The shelves are made from the boiler plate. They are cut out by the torch, the holes being made the same way. The receptacles for the cans and the racks for the welding rod are made from pieces cut from the boiler tube. A coat of paint will improve the looks of the rack. The receptacles can be stenciled or painted in colors to indicate the kind of material held by each.



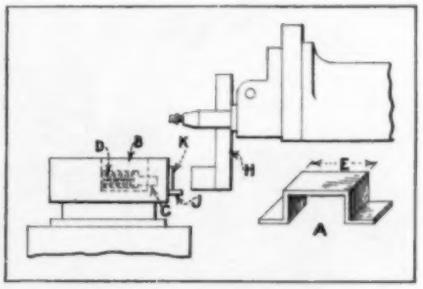
A rack for the welding shop

Device for Cutting-Off Pins—Discussion

By Charles Kugler

Reading the article by O. Holm, under the title given above and published on page 462, Vol. 65, of the *American Machinist*, reminded me of another kind of work I saw being done in a shaper—forming thin sheet-metal pieces such as at *A* in the illustration.

The steel block *B*, having a plunger *C* backed up by the coil spring *D*, was clamped in the jaws of the shaper vise. The block was of the same width as the dimension *E*, while the tool *H* was of the same size and shape as the inner part of the work. The blank to be formed was set on two pins *J* driven into the jaws of the vise, and is shown in position at *K*. With the set-up as shown, the vise took the place of a die, the tool acted as a punch, and the spring plunger ejected the work after it had been formed.

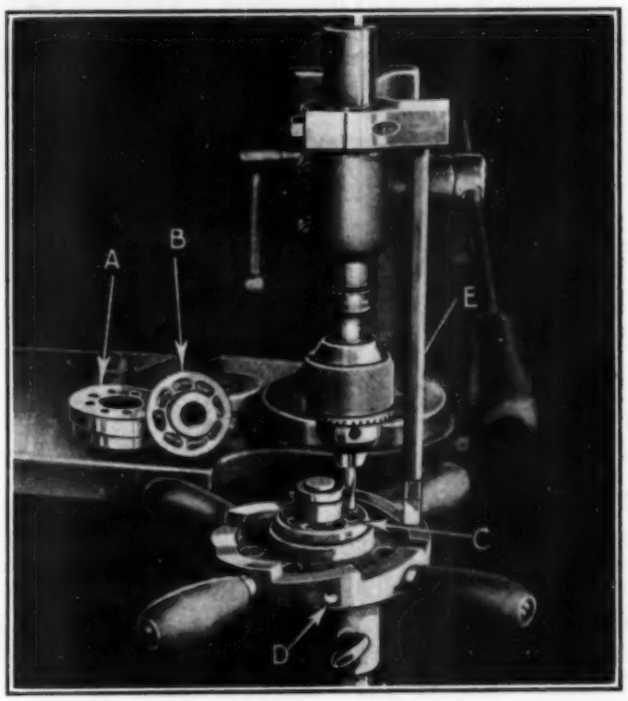


Forming work in a shaper

Profiling a Ball Ratchet

By Victor E. Albert

The making of an eight-point ball ratchet, or friction drive, is a job that would puzzle many good mechanics. The fixture shown is used in a drilling machine for cutting the curved, sloping slots in which the balls work. The steel disks used are 3½ in. in diameter and before the ball slots, or runs, are cut, eight holes ⅜ in. in diameter and ½ in. deep, are drilled as shown at *A*. Next the disk is put into the fixture and the ball runs machined as shown at *B*, and *C*. The ball runs are first roughed out with a ⅜-in. drill, starting ¾ in. from each hole and cutting gradually to the bottom. The cut is not made at one pass, but the operator first runs the drill lightly over the course of the cut to be made, and then takes another cut a little deeper, and so on until the desired depth is reached. Usually four passes are needed for each run, but since the cuts are quickly made, the entire operation takes comparatively little time. The disk to be machined is set into the indexing and profiling form *D* and is held in place by means of a key and keyway, as well as a clamping nut on the work spindle. The stiff bar *E*, is clamped to the sleeve of the machine spindle at its upper end, while its lower end contacts with the surfaces of the profiling form as shown. The operator moves the profiling form to the right as he presses down on the feed lever, until the end of the bar *E* butts against one of the rises on the profiling form. The feed lever is then raised enough to let the end of the bar contact the top of the rise, which puts the various parts in position for roughing out the next ball run. After being roughed out with a drill, the runs are finished with a ball-end milling cutter.



Profiling fixture on a drill press

The ball ratchets are hardened and then assembled on a vertical spindle with the ball runs down. The ⅜-in. steel balls used in the slots, rest on a hardened-steel disk of the same diameter as the ratchet body.

Removing Burrs from Small Work

By Henry C. Francis

Removing burrs and chips from small work is not always easy. Tumbling is very apt to bend or distort small pieces, so the Hoover Co. utilizes a sand riddle as shown in Fig. 1. The vibration of the riddle seems to shake the pieces against each other enough to remove slight burrs and fins and at the same time has no tendency to distort the pieces.

Chips have a tendency to cling to aluminum parts as they come from the screw machine. After trying several methods of removing these chips, the chute shown in Fig. 2 was tried and adopted. The pieces fall into the chute and are agitated enough to remove the chips as they slide down.

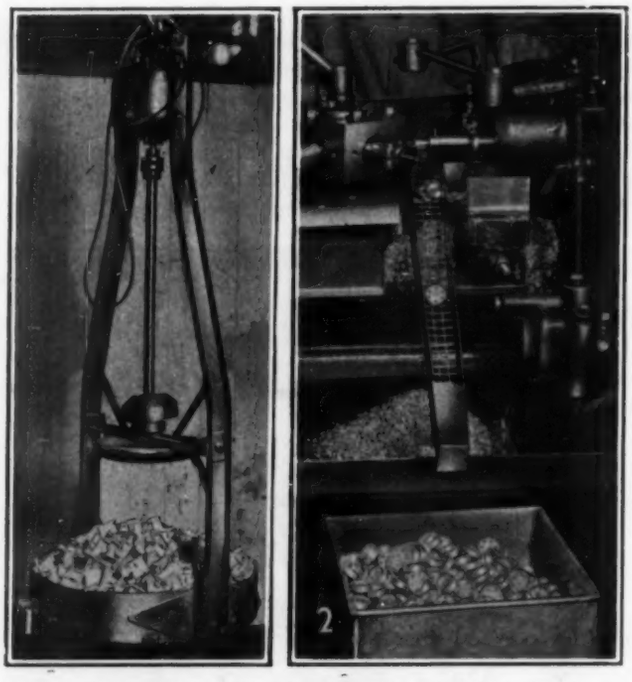


Fig. 1—Removing burrs and fins in a riddle. Fig. 2—Chips fall through a chute having a mesh bottom

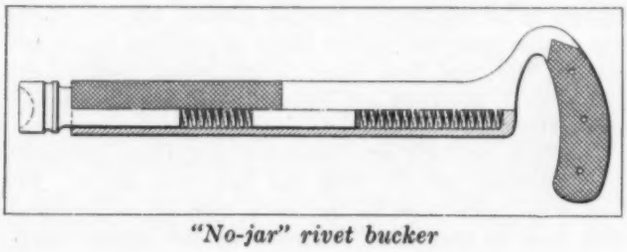
A "No-Jar" Rivet Bucker

By John Madden

The rivet bucker illustrated is in use in the shops of the Oregon Short Line of the Union Pacific System, at Pocatello, Idaho.

As shown, the casing has a knurled portion of the riveting end to afford a good grip, and is equipped at the other end with a pistol grip, also knurled.

The "no-jar" features consist of the bend where the casing is formed into the handle, and the two springs inside of the casing. All told, the parts of the bucker are the casing, two springs, a piece of plain shafting, the rivet set, and two grip plates with the necessary rivets. It is no trick to fasten the two springs to the piece of shafting and the handle end of the rear spring to the casing to prevent the insides from falling out.

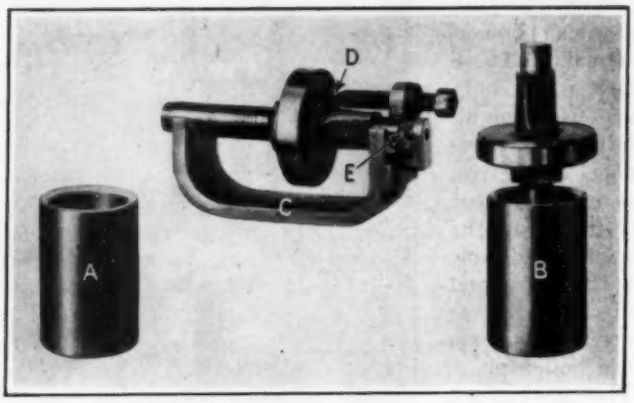


"No-jar" rivet bucker

Gages for Emergency Valves

By Chester H. Franklin

The illustration shows the gages used for testing the position of the seat on the emergency valve of the Westinghouse air brake. The tube *A* is used to test the distance from the lower end of the stem to the valve seat as at *B*. A scale placed across the lower end of the tube tells the story.



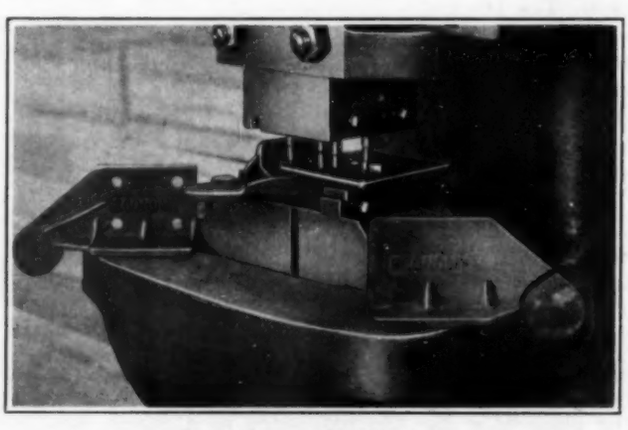
Gages for checking emergency valves

The gage at *C* checks the distance from the top of the seat to the upper end of the stem. The stem rests in the Vs at each end, and the points *D* and *E* check the upper side of the valve.

Punching Holes in Malleable Castings Reduces Cost

By Frank L. Eidmann

A considerable saving is accomplished by the Economy Engineering Co. of Chicago, Ill., by punching rivet holes in malleable iron castings instead of drilling them. The illustration shows a malleable-iron hinge casting in the punch press. Four holes $\frac{7}{16}$ in. in diameter are punched at a time. The thickness of the castings is $\frac{1}{4}$ inch.

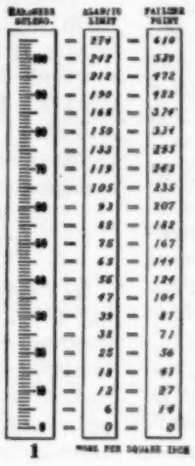


Punching malleable iron

Methods of Hardness Testing

The Scleroscope and Its Use

The scleroscope measures hardness by a comparison of the effect of the drop and rebound of a diamond-tipped hammer. This hammer drops by the force of gravity from a fixed height onto the test specimen. The resulting rebound is then read on a graduated scale. The chief advantages claimed for this type of tester are: It is direct-reading, and rapid for commercial work; it can be employed for very thin pieces; it does not injure finished surfaces by marking; because of its rapidity and ease of reading several tests can be made at different places on the piece and the mean value taken. In determining the scale of the scleroscope the number 100 was taken as the average rebound value of quenched pure high-carbon steels. Graduations were made above and below this point in a similar manner to that of the Centigrade thermometer about the boiling point of one hundred. The scleroscope hammer at the end of its drop exerts a momentary pressure exceeding 470 tons per sq.in. and makes a permanent impression, though this mark is of negligible size. The readings of the dial are the product of dividing the striking energy of the hammer by the microscopic distance penetrated into the test specimen. If no penetration occurs in an exceedingly hard material, only comparative hardness readings can be obtained by this method.



1

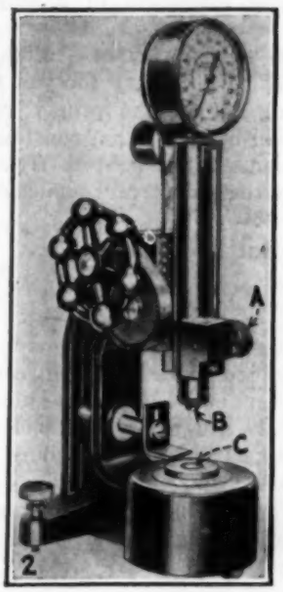
It is claimed for the scleroscope that it is the only instrument that will measure the hardness of dead soft metals with the same facility that it measures super-hard metals. Since hardness is the property which resists deformation under pressure, the scleroscope hardness readings bear a direct relation to the elastic limit and failure point of the test piece. In Fig. 1 this relation is shown.

A standard type of dial-recording scleroscope is shown in Fig. 2. A long hammer within the body of the instrument, and containing the diamond point, is automatically hooked up when the head is raised after each test by the knob *A*, so that the drop to the point *B* is always constant. A delicately arranged mechanism within the head transfers the movement of the rebound to the dial indicator. The anvil may be flat as shown in Fig. 2, or it may be a V-block for holding round pieces.

The dial-recording scleroscope for the production testing of large pieces is built with a swing arm instead of a fixed frame and base. A vertical scale scleroscope is illustrated in Fig. 3. This machine is equipped with a lense and pointer needle for noting slight variations above or below a given hardness point. It is also fitted with a suction mechanism operated by a hand pressure bulb for drawing up, catching, and releasing the hammer.

The scleroscope is claimed to have a test capacity of 1,000 tests per hour. On hardened steel pieces, such as razor blades, the minimum thickness that can be tested is about 0.005 in. The minimum thickness for testing cold rolled unannealed brass or steel is about 0.010 in., and that for annealed sheets is about 0.015 inches. For testing case-hardened steel a minimum case of 0.010 in. is necessary to insure correct readings when the core is 30 hard. If the core is softer, a minimum case of $\frac{1}{64}$ in. is required.

The piece to be tested should always present a level surface to the diamond-tipped hammer, and the harder the material the smoother the surface must be. However, for comparative work, or by allowing a figure of correction, tests can be made on scaled surfaces if they are not actually blistered. The hammer should never be allowed to strike more than once on the same spot, or too near the spot, as such readings will be of no value. All pieces should be mounted solidly. If pieces are mounted correctly the hammer will strike with a solid thud instead of giving a hollow sound.



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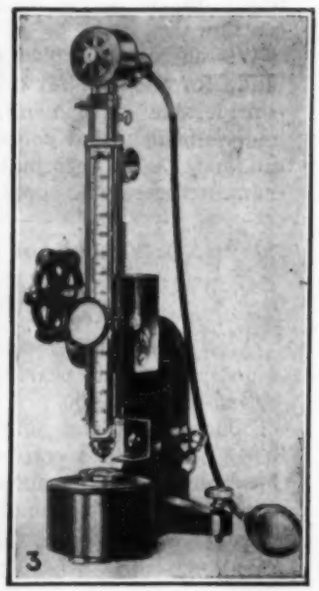

3

Owing to the slight rebound of the hammer when testing very soft metals, a magnifier hammer is used having a larger point area. This point enables it to rebound higher, thus magnifying small variations in hardness. Readings taken with the magnifier hammer, however, must be converted to standard readings in ordering material to specification.

For the information given we are indebted chiefly to the Shore Instrument & Manufacturing Co.

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Practical Shop Problems

Questions of a Practical Nature will be answered in these columns

Black-Finishing Lead Plate

Q. We are making a large number of small parts from terne plate, namely lead-coated sheets, and we desire to produce a dull black finish on the lead surface of these sheets, preferably by dipping or spraying. We have tried various kinds of lacquers and enamels, but are impressed that an oxidizing process would be better for our use. Any information that you can give us will be appreciated.

A. Since the oxides of lead are either red or yellow, and the peroxide is brown, it is not possible for you to produce a black finish on lead by oxidation. The coating on terne plate is 90 per cent lead and 10 per cent tin, and we believe that you may obtain a suitable black finish on the parts by the formation of a sulphide coating.

We suggest that you try a solution of sodium sulphide for the dip. It may be necessary for you to do considerable experimenting to get the proper result, and we believe that you will be able to get considerable aid and useful information on the subject from the manufacturers who supply the industrial chemicals.

Steel for Ball Bearings

Q. What class of steel is generally used for the making of ball bearings?

A. A steel that is widely used in Europe and in this country for ball bearings contains 1.50 per cent of chromium and 1.00 per cent of carbon. The amounts of phosphorus and sulphur are limited to 0.020 and 0.015 per cent, respectively. There is no standard steel, however, for this purpose, and undoubtedly special steels will be continually developed for the improvement of ball bearings. In some cases small percentages of other elements besides chromium are already being used.

Designing a Small Bearing

Q. We desire to secure a bronze bearing metal, which we can safely guarantee against overheating on a ⅜-in. steel shaft at a speed of 10,000 r.p.m. It is suggested that we use an alloy of 80 per cent copper, 10 per cent tin, and 10 per cent lead. We would be pleased to have you offer a suggestion.

A. There is no bearing metal nor any bearing that can be guaranteed to stand up against overheating, regardless of the speed, because the speed is only one factor of overheating. If the pressure on the bearing is excessive the bearing will overheat, or if the bearing is too small in area it will cause high unit pressure and result in overheating. Improper lubrication will also raise the coefficient of friction, and cause overheating.

A speed of 10,000 r.p.m. for small shafts is not considered high. Small grinding shafts regularly operate at much higher speeds. Unless you have a special reason for doing so, we do not consider it necessary to make a special bronze for this bearing. You can use one of the standard bearing bronzes now on the market.

On the other hand you would probably get better results by employing ball bearings for the shaft. Standard ball bearings of this size can be found on the market. These bearings require less attention to oiling, will stand high pressures and high speeds, and will undoubtedly meet your requirements of "guarantee against overheating."

Charging for Contract Drawings

Q. Please tell me the best way for charging for drafting time. Is it best to charge a flat hourly rate, to contract for a job, or to work on a percentage based on the apparent value of the article? I am a draftsman, and do work of this kind in my spare time, with the object of possibly securing enough work to warrant starting a business of my own.

A. The only satisfactory method of taking outside drafting work is on a contract basis, although occasions will arise when the hourly rate charge will be preferred by the client. There is no necessity for you to stick absolutely to one method.

The client usually wants to know in advance what the job will cost. He would rather pay a little more, and have a definite charge, than to be in doubt until the completion of the work. From your own standpoint, you must learn from your experience how to estimate the approximate time even of hazy or indefinite jobs. Then, when you give a price, you will have an incentive to work faster to complete the job in the minimum time. On an hourly basis you will have little opportunity to develop your business or your own business ability, and you will be little better off than you would be on a straight salary basis.

Some jobs will be straight mechanical work, while others will require different degrees of design ability. This factor must be taken into consideration in making your estimates. Or, if the client demands a straight hourly basis, you must charge a higher rate for design than for ordinary copy drawing.

To charge "on the apparent value of the article" will not get you anywhere. This method is followed by architects, but it must be remembered that the architect furnishes the ideas, and also assumes responsibility for a satisfactory final job. With the architect the drawing is only a tool, the job being the ultimate aim, but with most of a contract draftsman's work the drawing is his final responsibility, with no responsibility for the mechanical apparatus. However, if you furnish design and responsibility, you should estimate accordingly. Your experience is the only method of judging this factor.

Technical Abstracts

Burning Pulverized Coal

Many manufacturers who have converted their plants from coal to oil firing have become enthusiastic, but when compared with the most modern method of burning coal in pulverized form the use of oil as a fuel can only be justified where the conditions are exceptional.

Oil fuel can be successfully applied to the firing of small furnaces, and will vie for economy with the use of high pressure gas. Its use is particulary suitable in conjested cities where the facilities for handling and storing oil fuel, the elimination of ashes, and the possible abolition of smoke, all combine to make its application attractive, but here the general advantages therefrom have outweighed all considerations of economy.

The burning of pulverized fuel bears a considerable resemblance to oil or gas firing, being delivered through a burner instantly regulated and controlled, and capable of being stopped or started at a moment's notice. The high capital cost usually associated with the storage of pulverized coal is no longer necessary.—The *Machine-Tool Review* (England), Sept.-Oct., 1926, p. 109.

The Engineer's Viewpoint

It is a strange thing that in all the ages that man has existed it was only about a hundred and fifty years ago that he discovered how to machine a flat surface and a cylindrical one. In other words, machine tools had their birth. The ancient world possessed crude grinding millstones driven by water wheels, but no machines actuating cutting tools.

The possession of two master tools, the lathe and the planer, has made it possible to build upon these as a basis the great superstructure of automatic machinery that we possess today. In reading the history of the first steam engine, one is impressed with the difficulty Watt had in getting accurate machine work. Before the days of machine tools such a simple thing as drilling a hole correctly through a metal plate required a high degree of skill. Now, with modern jigs and machines it is as hard for a boy to get it wrong as it was for the skilled man to get it right. This is technically known as the transference of skill. In the shoe manufacturing industry today there is hardly a man who could make a pair of shoes. The consequence of all this has been to change society from top to bottom.

Generally speaking, the introduction of machinery causes suffering until labor adjusts itself to the new conditions, and this sometimes means a generation of workmen before the adjustment is complete. However, while labor-saving machinery may at first degrade labor, it eventually produces goods in such abundance and so cheaply that the laborer shares in the benefit.

The workman used to own tools, but these have become so elaborate that great corporations have taken them over. The personal contact is gone, and organization and standardization is everywhere. More and more technically-trained men are going into managerial positions. The modern engineer is the one thing in our civilization that no other civilizaton ever possessed. Industralism has come to stay. The mechanical revolution has made mass production possible, and has allowed science to advance by leaps and bounds.—Prof. Sumner B. Ely, in *Scientific Monthly*, November, 1926, p. 463.

Russian Machinery Industry

Before the revolution, Russia's metal industries were almost entirely in the hands of foreign interests. Before the war 41 per cent of the total machinery requirements of the territory now forming the Soviet Union was imported from abroad, and only 12 per cent of the lathes used in the country were made locally. Neither the automobile nor the airplane industry was in existence before the war.

During the World War and the civil strife the metal industries suffered heavily, and they have recovered only in the last three or four years. However, the present output for metal turning lathes is 267 per cent of the 1912 figure, and that for textile machinery is double the pre-war figure. During the 19 months from October, 1924, to April, 1926, the number of metal working plants increased from 368 to 421, with a present working force of 484,683 employees. During the fiscal year 1925-26 these plants have been working at 100 per cent of their pre-war capacity.

The Supreme Council of National Economy has been distributing orders for the import of equipment necessary for existing plants and for new plants under construction. Up to the present the major part of the orders have been placed in Germany because of credits guaranteed by the German Government. The terms of these credits are for 4½ years, the payments to begin in 2 years. The credit guarantees amount to 85,000,000 dollars.—*Russian Review*, Nov., 1926, p. 188.

Sticking to the Old Rut

Standardization is an excellent principle in industry, but it means death in those commercial activities where brains alone create progress, and crystallized sales methods stunt development. A rut is a wonderfully restful thing, like a railway track, provided it goes where you want to go.

Every industry and every business should have periodic surveys, when every detail of the organization and its products will be thoroughly analyzed by eyes and minds that are not crystallized by old methods and markets. Moreover, millions of dollars may be found in the regular products of many factories by the simple means of discovering new uses for present products, and by teaching new people to feel the need for the things that these products will accomplish for them. Numbers of fine products are wending their humdrum way down the slow streams of commerce because the market is mismeasured. Contented business men spend time and money pushing their businesses along old conventional lines, because they do not realize that the same rut deepens every year. It takes more courage and originality of thought to seek new conquests.—W. R. Hotchkin, in *Advertising and Selling*, Aug. 25, p. 22.

Development of Disk Grinding

The need for a grinding machine to finish to size economically, and to polish after hardening, such tools as square dies, toolmaker's clamps, etc., prompted the original idea of a disk grinding machine. The first machine had 10-in. diameter disk wheels of cast iron, faced with emery cloth, and was really a very satisfactory tool for the work.

The first abrasive disks were cut from ordinary commercial emery cloth, a No. 36 grain being the coarsest then made. As a result of persistent efforts an abrasive cloth was made on which the grains were applied to the cloth by means of glue. Such disks are now manufactured, and are known as glue-bonded disks. It was not, however, until the advent of the thick abrasive disk that the real advances in disk grinding were made.

By means of a special cement we have been able to apply an exceedingly heavy coating of abrasive crystals to a cloth backing; the standard type of disk now in use ranging from ¼ to ⅝ in. in thickness. It may be composed of any grain from No. 12 to No. 150, and is made of any degree of hardness to suit the work in hand.

A grinding machine depends upon three things: rigidity, power, and stock-removal. A machine without rigidity is inefficient; one without a sufficient amount of power is in the same class. The third factor, stock-removal, does not have to do with the machine itself but depends upon the interest displayed by the user in making the machine a producer.—F. E. Gardner, in *Abrasive Industry*, December, 1926, p. 362.

American Machinist

KENNETH H. CONDIT AND FRED H. COLVIN
Editors

Established 1877

The Importance of Confidence

CONFIDENCE in the salesman or his company is often the deciding factor in the making of a sale. If the salesman has made good in previous tests of honesty and fairness, if the company has always stood squarely behind its product and its representatives, the chances are better than even that the order will go to that salesman and his company.

The reasons should be perfectly obvious, yet many companies and more salesmen have failed to comprehend them. If there is occasion for the buyer to believe that the salesman works on a policy of "business is business," or "caveat emptor," the buyer must put a lot more effort and care into the transaction, to be sure that he is getting his money's worth, than should be necessary. Likewise, if the company's only concern is the immediate sale there is reason for the buyer to beware.

There may be buyers whose principal joy is the dickering of the market place, who have that lust to "do" the other fellow that is supposed to be a vital part of the business man's make-up. But there are many more who would rather pay a little more and be free from any worry about the performance of the machine or about their success in getting the seller's bottom price.

Saving the Injured

REHABILITATION is a word that was much before us during and immediately following the war. The wonderful work done by the Government training schools in the rehabilitation of the crippled soldier, and in getting him back on a self-respecting, earning basis, is well known. But little has been said of the rehabilitation of the disabled soldiers of industry.

In spite of safety campaigns thousands of accidents occur annually in our industrial plants and railroads, and thousands of workmen receive injuries that render them incapable of continuing in their regular employment. More persons are disabled in industry every year than were injured in the American forces during the entire war. These men normally do not want charity, nor compensation, nor coddling. They want encouragement and opportunity to earn their own living. Police records show that a crippled beggar in New York can make fifty dollars a day—but self respect cannot be bought at any price.

Industrial employers might do well to interest themselves in the work being done by the Institute for Crippled and Disabled Men, which was founded by the American Red Cross to train and rehabilitate the army of crippled industrial workers. Membership in the Institute is a small thing for a company financially, but it means that the firm is giving by its support just the encouragement that the disabled man needs most to put him back to the status of a wage earner.

Circus or Engineering Meeting?

NOW that the annual meeting of the American Society of Mechanical Engineers has passed into history one is moved to wonder whether it was an engineering gathering or a five-ring circus. Many members who attended the meeting were annoyed to find conflicts in scheduling of papers they wanted to hear. Thus they were forced to miss the verbal discussion on subjects in which they were interested because they thought it more important to take in some other session.

No fault can be found with those who laid out the program. Considering the scores of papers that were presented it is a wonder that there were so few serious conflicts. But that is small comfort to the ones who missed out on something they wanted to hear.

The solution of the problem is not easy but it may be found in the very growth, in strength and numbers, of the professional divisions. Has the Society reached the stage in its development where it can relegate technical details to the professional division interested and devote its time at the national meetings to questions that are of broad interest to all mechanical engineers? Papers on economic aspects of engineering would appeal to the whole membership. Ethical problems might even have some consideration. And surely research and standardization are fundamental to the advancement of engineering practice.

A convention made up of the business meeting, the social functions, the Thurston and Towne lectures and one outstanding paper from each professional division would fill four days and still leave some time for vitally important committee work and the informal chats and reunions that are so pleasant a part of the gathering. Technical matters could be discussed at the meetings of professional divisions held at convenient times and places during the year. Several of the divisions are already conducting such meetings and the others could well do the same.

Perhaps the Society is not ready as yet for such a departure from established tradition, but some change must come and it will be wise to start thinking about it now.

Shop Equipment News

Putnam Car-Axle Burnishing Lathe

The Putnam Machine Division, Manning, Maxwell & Moore, Fitchburg, Mass., has placed upon the market a machine for burnishing the journals of car axles. The bed of the machine is of box section with the supports cast integral with it. Upon the bed are mounted two tailstocks, two carriages, and the driving head. Both tailstocks are adjustable along the bed and are provided with binders. The tailspindles are also capable of separate endwise adjustment.

Each carriage has in its apron a handwheel, gearing and a pinion to mesh with the rack of the bed for the purpose of traversing the carriage by hand; no power feed is included in the design. The carriages have three bearings surfaces upon the bed; V-ways, or shears, at front and back, and a flat way directly under the front burnishing roll to relieve the carriage bridge from the downward pressure. The carriages are held to the bed with adjustable tapered gibs.

Each carriage has two cross-slides, moved to and from the centerline of the machine by a right- and left-hand screw. The screw engages bronze nuts on each cross-slide but has no thrust bearing in either direction; when the burnishing rolls are brought to bear upon a journal to be burnished, the pressure is equalized between them and all strains are absorbed by the screw itself.

The burnishing rolls are mounted upon large plain bearings of bronze within the housings of the cross-slides. The axes of the rolls are inclined at a slight angle to the horizontal, so that when the rolls are brought together upon a revolving journal they will tend to creep lengthwise of it as if generating a helix. This tendency is sufficiently pronounced to pull the carriages along the bed, thus eliminating the necessity for a separate power feed. When the shoulder at the end of the journal is reached, further progress is halted without damage to the rolls or marring the burnished surface of the journal.

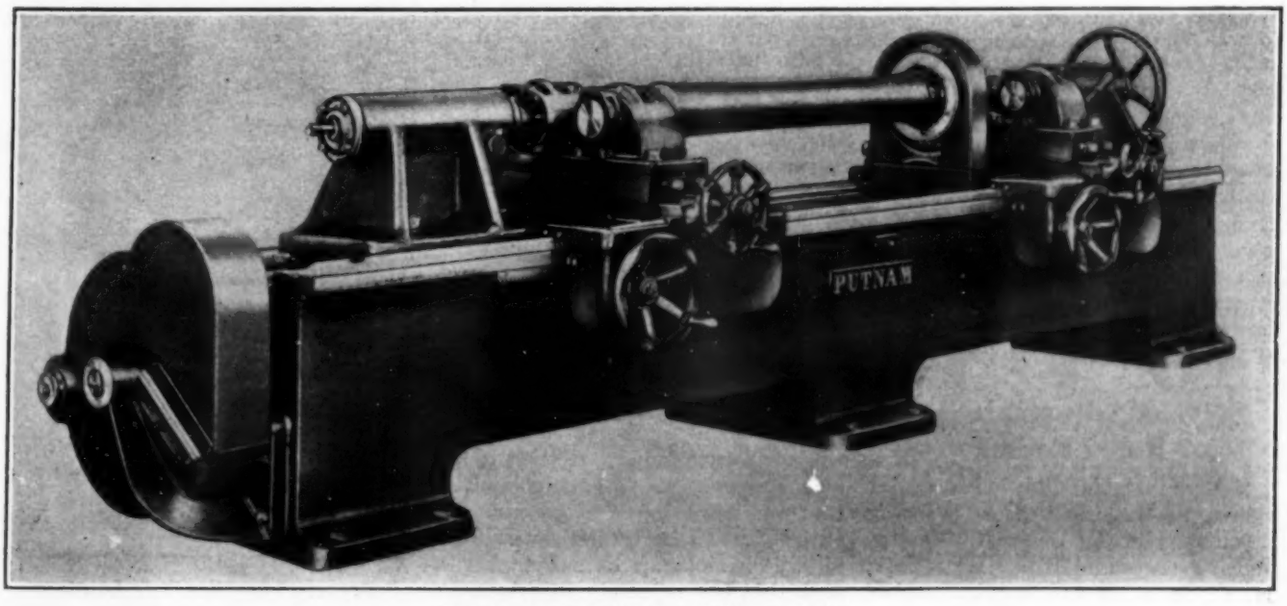
A self-centering ring chuck is mounted upon the wheel-seat at one end of an axle before the latter is swung into the machine. When the axle is on centers, the gear that forms the outer body of the chuck is in mesh with the driving gear at the center of the bed. A separable guard that covers the gears is hinged at each side of the bed so that it can be unlatched and swung out of the way when an axle is to be put into or taken out of the machine.

The machine is driven by a constant-speed motor on the rear of the bed. There are only three pairs of gears in the driving train, including the motor pinion and the gear of the ring chuck.

The machine is furnished with or without a crane to handle the work, as desired. Without the crane its weight is 8,500 lb., and it occupies a floor space of 14 ft., 6 in. by 4 ft., 8 in. Its capacity is such that journals from 2 to 8½ in. in diameter can be burnished, and it will take axles up to 9 ft., 1 in. in length between centers.

Hoefer Indexing Table

The Standard indexing table and base shown in the accompanying illustration was brought out by the Hoefer Manufacturing Co., Freeport, Ill., for use with any of their line of drillers, special drilling machines, and multiple-spindle heads. By combining this table with an auxiliary head, loading can take place in one position, drilling in another, counterboring in a third, and so on; or other combinations of oper-

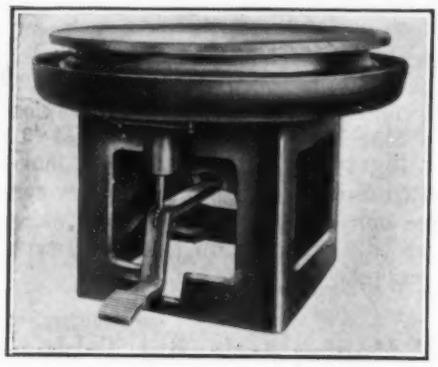


Putnam Car-Axle Burnishing Lathe

Shop Equipment News

ations such as hollow milling, tapping, spot-facing, threading, reaming, or countersinking can be performed in the various positions available.

A large square base enables the unit to be bolted to the base of any drilling machine. Mounted on this base is the top plate which is the sub-base for the indexing table. It contains an oil trough of ample size for catching the lubricant. The Sub-base also contains the index



Hoefer Indexing Table

locking plunger, which is designed for foot operation. This plunger is a hardened and ground taper and engages hardened and ground bushings, the number depending on the stations required for the work in hand. These bushings are accurately spaced around the underside of the indexing table, so that correct registration is assured in all positions. Both the plungers and the bushings are protected from dirt and foreign matter.

The table itself is flat finished so that any number of different fixtures can easily be attached. It is carried on a large central locating stud, held down by a collar on the lower end, so that adjustment can be made to compensate for wear. The table rests on roller bearings spaced around the top of the sub-base. The construction is such that it can be turned with little effort on the part of the operator.

Stevens Adjustable Dial Index Center

The adjustable dial index center shown in the illustration is being manufactured by John B. Stevens, Inc., 27 Cleveland Place, New York, N. Y. It is for use in re-cutting or grinding flutes in taps or reamers and teeth in cutters. The regular dial is drilled for three or four stations.

The work can be held either between centers or in a chuck held and driven by taper shanks, as desired. A ½-in. self-centering chuck with shank, can be supplied. With the latch pin in the hole in the dial, the head spindle can be turned to bring the edge, face, or contour of the tool being ground in position relative to the emery wheel, and then bound so that the various other positions can be indexed.

The head can be purchased without the tailstock and without the dogging center. A rectangular base with tongues for ¾-in. T-slots is

Stevens Adjustable Dial Index Center

regularly furnished. Tongues for ⅝- or ½-in. T-slots can be supplied, if specified. A round base can also be furnished, permitting the swiveling of the head 25 deg. either way of the machine centerline for grinding or cutting at an angle.

The maximum swing is 7 in. in diameter.

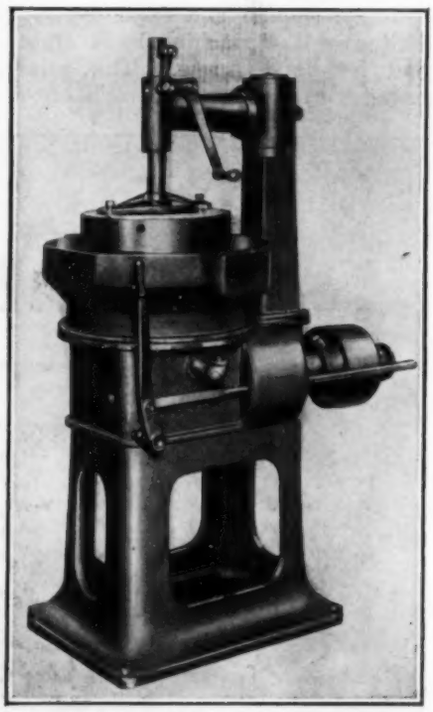
Bethel-Player No. 1-U Flat and Cylindrical Lapping Machine

The machine shown in the accompanying illustration has been brought out by the Bethel-Player Co., Westboro, Mass., for the precision lapping of parts on a production basis where the quantity to be produced is not large enough to warrant the purchase of the larger standard machine of the same type. It is applicable to all small flat parts, such as gage-blocks, disks, etc., that must be of a definite and exact thickness with parallel surfaces, or to cylindrical work, such as plug-gages, measuring wires, bushings and similar parts that also require to be parallel and of exact size.

This machine weighs but about one-third as much as the large one and occupies proportionately less floor space. Some of the automatic features that are incorporated in the latter have been omitted.

The laps are of cast iron and are charged with whatever lapping compound may be suitable for the work in hand. The lower lap revolves, while the upper lap remains stationary, being loosely suspended from a spider that is attached to a lever-operated spindle by which the lap may be raised in order to load the work. This spindle is carried by an arm that swings about the column so that the upper lap can be removed entirely when loading the work-carrier. The manner of suspension is such that the upper lap adjusts itself to inaccuracies of the work at the beginning of the lapping operation.

A circular plate, somewhat less in thickness than the work to be lapped, lies between the laps when in working position, and the work-pieces lie in cut-out openings in this disk, of a size and shape to accommodate them. The disk is given a slow, gyratory movement, which causes the work-pieces to be swept over the



Bethel-Player No. 1-U Lapping Machine

Shop Equipment News

entire surface of the laps, occupying the same relative position twice only in several hundred revolutions.

The drive to the lower lap is through a steel worm and a bronze wormwheel keyed to the lower end of the vertical lap-spindle. Ball thrust bearings at each end of the worm and at the lower end of the spindle sustain the working load. The lap-spindle is hollow, and through it extends a stationary spindle, to the upper end of which is keyed a spur gear. Pinions, carried on fixed studs in a floating spider lying in the large open space at the center of the revolving lap, mesh with the stationary gear and also with an annular gear that is carried by the lap, thus constituting an epicyclic train. Offset throws, or studs, in the top of the pinions enter corresponding holes in the work-carrier and impart to it the gyratory motion as the pinions are rolled around the central gear.

The weight of this machine is 800 lb., and a floor space of 30x40 in. is required. It may be arranged for belt or motor drive as desired.

Hisey-Wolf Grinding and Buffing Machines

The Hisey-Wolf Machine Co., Cincinnati, Ohio, is building a line of motor-driven, double-end grinding, buffing and polishing machines for use on either alternating or direct

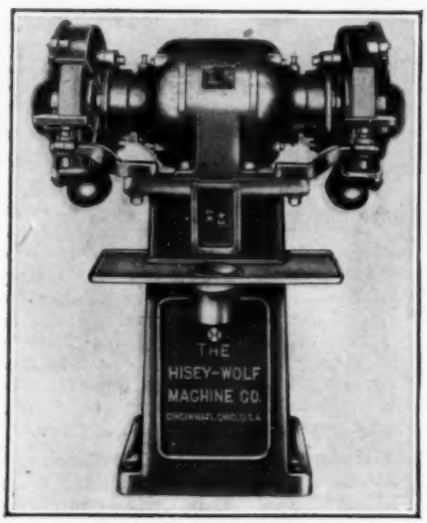


Fig. 1—Hisey-Wolf Motor-Driven Grinding Machine

current. The floor stand grinder is shown in Fig. 1. For single-phase alternating current, the machines are equipped with improved commutating-type repulsion-induction motors, which it is claimed will start and pick up speed instantly under any load within twice their rated capacity. Starting current under all conditions is low. It is also said that low voltage, due to line drops and other existing conditions, has no objectionable effect on these single-phase machines. For two- and three-phase alternating current, the machines are equipped with squirrel-cage motors. They are ruggedly built with a liberal factor of safety and reserve power.

In all cases the bearings are high-grade ball bearings, mounted in end heads in close proximity to the wheels. Buffing and polishing machines with incased-type spindle extensions (shown in Fig. 2) are equipped with four ball bearings, while in the open-type spindle extension (shown in Fig. 3) two ball bearings are used. All bearings are completely inclosed and protected from dust and grit. Oil chambers are provided that will contain sufficient lubricant for three months' use. Suitable flush or drain plugs are present to permit cleaning the bearing boxes.

Push-button control is standard equipment on both grinders and buffers. All motor starting and switch equipment is in accordance with the standards of the Electric Power Club. The grinding wheels are of diameters in proportion with motor speeds to give safe, but efficient speeds as recommended by the American Engineering Standards Committee. Wheel guards are of special design and are adjustable with the wear of the grinding wheel. Angular adjustment is also possible.

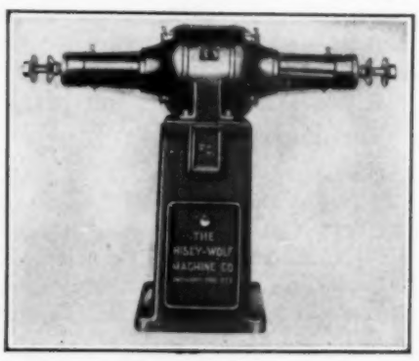


Fig. 2—Incased-Spindle Type Buffing Machine

The floor stand grinder, Fig. 1, is

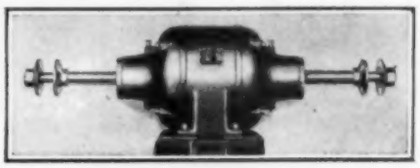


Fig. 3—Open-Spindle Type Buffing Machine

made in five sizes, with wheels varying in diameter from 7 to 14 in. and ¾ to 2½ in. face. Three of the sizes are also made with bench base mountings. The incased-spindle type buffing machine is made in four sizes, each with two buffing and polishing wheels varying in diameter from 10 to 18 in. and from 1½ to 3 in. face. The smallest machine is also made with bench base mounting. Five sizes of the open-type spindle extension machine are made with wheel diameters varying from 8 to 18 in. and with faces varying from 1 to 3 in. The two smaller sizes are made with bench base mounting.

Warner & Swasey Multiple-Cutter Turner

The Warner & Swasey Co., Cleveland, Ohio, has designed the multiple-cutter turner shown in the accompanying illustration for taking two or more simultaneous cuts on bar stock or forgings, without disturbing the accuracy of the finished work and without excessive set-up time. The time of the piece is the time used for the longest cut.

The turner consists of three parts; the body, the top plate, and the roll carrier. The body is heavy and rigid and serves as a support for mounting the top plate and one or two roll carriers. The top plate is held in position by bolts inserted from the bottom of the tool body. Spacer bushings between the bottom of the tool and the top plate prevent the latter from springing when the tools are clamped in position.

The cutters are plain bits and can be quickly set in various combinations by means of screws in the top plate. It is claimed that this method of clamping the cutter between the tool body and the top plate by means

Shop Equipment News

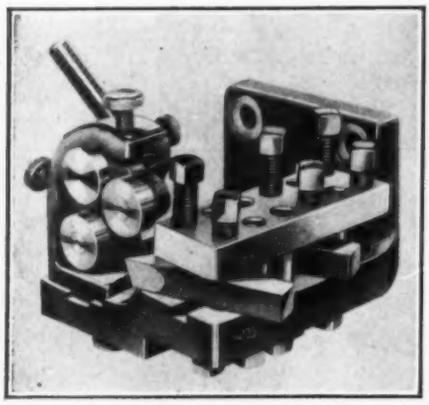


Fig. 1—Warner & Swasey Multiple-Cutter Turner

of screws bearing on their tops permits close turning to shoulders, collets, or a fixture, since it has the shortest possible overhang.

The rolls on the back rest are adjustable for varying diameters, while the back rest holder itself is adjustable longitudinally on the body. One back rest holder with rolls is furnished with each turner. If necessary, two back rest holders may be

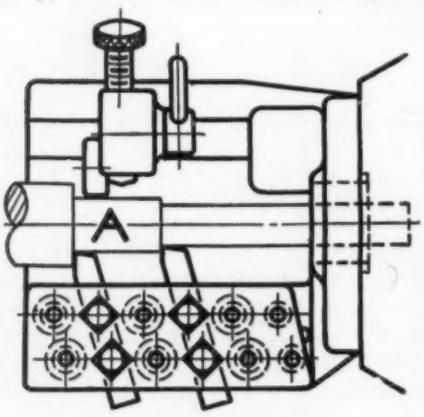


Fig 2—Tool layout

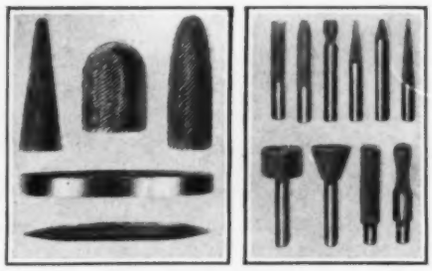
used. In Fig. 2, the application of this tool is shown. The roller rides on diameter *A* and follows the cutter. When two diameters must be held to close limits and accuracy and must also be concentric, two rollers are used.

For quantity lot work, single-purpose cutter blocks for holding the cutters may be substituted for the standard blocks. These special blocks are located by means of a tongue that fits into the groove in the tool body. The cutter slots and set screw holes are located to suit the requirements of the particular job in hand. This method provides accurate location of the cutters after having been sharpened, and also makes it possible to use a standard tool for certain types of work for which special tools have always been necessary.

Long stock, smaller in diameter than the turret hole, may be run through the turret when desired.

Rotary Files

The Rotary File Co., 279 Euclid Ave., Brooklyn, N. Y., is manufacturing thirty-one standard shapes of high-speed steel files or burs for use with flexible shaft equipment. A few of the shapes are illustrated. They are straight, concave, convex, balled, or coned. These files are adaptable in removing stock, reducing angles, cleaning filets, and reaching into difficult recesses, corners, and grooves.



Rotary Files

All blanks are turned down on a lathe from high-speed steel stock, the cutting being done by hand with a universal spiral cut, so that the tool works equally well on steel, iron, aluminum, or brass. Coarse or fine cuts can be supplied when required. After the cutting tools are inspected for the elimination of "lands," the product is hardened at 2,250 deg. F. by a special process that improves the edges, rather than burning them.

Special sizes can be furnished on request.

Meyer Automatic Tapping and Drilling Machine

On page 967, volume 65, of the *American Machinist*, a description was given of the so-called "Boeger-Meyer" automatic tapping and drilling machine, made by the Boeger-Meyer Machine & Tool Co., 61 McWhorter St., Newark, N. J. This machine should have been entitled "Meyer" automatic tapping and drilling machine.

Trade Catalogs

Ball Bearings. The New Departure Manufacturing Co., Bristol, Conn., has published a leaflet describing the advantages of electric motors equipped with ball bearings. The leaflet is illustrated.

Blowers, Type "SE". The American Blower Co., Detroit, Mich., has published bulletin 2004 on its type "SE" steel-plate blowers, which have been developed especially for forced draft installations. Construction of the fan is described and complete dimensional data are given. A table of capacity ratings is also included. The leaflet is illustrated.

Diamonds, Industrial. The Wheel Trueing Tool Co., Detroit, Mich., has published a booklet entitled "The Diamond and Industry," in which the uses of industrial diamonds are pointed out. In the introduction a brief description is given of the diamond deposits and the mines of South Africa. The selection of diamonds, the care of diamonds, and the function of the diamond expert and his relation to industrial problems are then discussed. Special attention is devoted to the use of diamonds as a means for trueing abrasive wheels for accurate grinding work.

Fans and Blowers. The American Blower Co., Detroit, Mich., has issued bulletin 8001 on its "Sirocco" Fans and Blowers. The bulletin contains eighty 8½x11-in. pages, consisting largely of engineering data sheets of ratings of the various sizes and types of blowers. The machines are completely described with the aid of detailed photographs of the various parts. Complete dimensional specifications are also given.

Grinders, Plunge-Cut. The Cincinnati Milling Machine Co., Cincinnati, Ohio, has published a bulletin containing twelve 8½x11-in. pages on its plunge-cut grinder. A complete description of the operation and construction of the unit is given in considerable detail. The important parts of the machine are described and illustrated in turn by means of numerous photographs. Complete specifications are also included.

Grinders. The Standard Electrical Tool Co., Cincinnati, Ohio, has published a leaflet on its portable bench grinders, electrical driven. Electrical portable drills are also described.

Rebuilt Machinery. J. L. Lucas & Son, Inc., Bridgeport, Conn., has published list No. 70 on its rebuilt machinery. The booklet contains 84 pages and is devoted largely to machine tools, classified as to types, such as grinders, milling machines, lathes and so on. Each tool is briefly described in catalog style. The more important machines are illustrated. The booklet is indexed for ready reference.

News of the Week

James H. McGraw Honored by Industry

Testimonial dinner sponsored by leading figures in engineering and industrial world marks forty-one years of service as publisher

COMMEMORATING forty-one years of service to the engineering and industrial progress of the country, and incidentally the sixty-sixth birthday of the guest of honor, over one thousand of the leaders in business, industry and science gathered at the Hotel Astor, New York, on Dec. 17, as a testimonial to James H. McGraw, president of the McGraw-Hill Publishing Company, Inc., the largest publisher of technical and business magazines and books in the world.

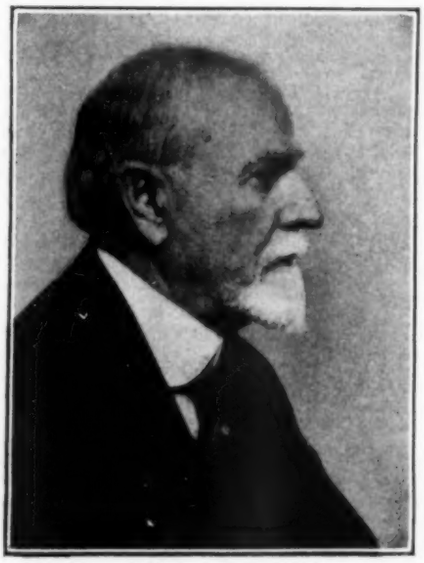
The committee that sponsored the dinner included Thomas A. Edison, as honorary chairman, Secretary of Commerce Herbert Hoover; Gen. Guy E. Tripp, chairman of the board of the Westinghouse Electric and Manufacturing Co.; Gerard Swope, president of the General Electric Co.; and Owen D. Young, chairman of the board of the General Electric Co. Others on the committee were J. J. Carty, vice-president, the American Telephone and Telegraph Co.; Simon Guggenheim; John Hays Hammond; William Barclay Parsons; George Otis Smith, director of the U. S. Geological Survey; Sidney Z. Mitchell; Fred R. Low, editor of *Power;* Samuel Insull; Adolph S. Ochs; William T. Dewart; Karl A. Bickel; Dr. Livingston Farrand, president of Cornell University, and Nicholas F. Brady. Arthur Williams, vice-president of the New York Edison Co., was Chairman.

The speakers represented some of the fields covered by McGraw-Hill publications, in which Mr. McGraw has long been an important factor. Gen. Tripp spoke as the representative of the electrical manufacturing industry; Dean Dexter S. Kimball of the Cornell University School of Engineering, spoke on behalf of engineering; Charles L. Edgar, president of the Edison Electric Illuminating Co., of Boston, for the power industry; and Willits B. Sawyer, president of the American Electric Railway Association, for the electric railway industry. John W. Lieb, vice-president and general manager of the New York Edison Co., was toastmaster.

Edward J. Mehren, vice-president of the McGraw-Hill company, and editorial director of the organization, spoke for the organization of which Mr. McGraw is the active head.

During the course of the dinner telegrams were received from some of the guests who were unable to be present. A few of these were:

BENEDICT CROWELL, president of the Army Ordnance Association — "On behalf of the Army Ordnance Association, I wish to extend to you our congratulations and best wishes on the occasion of your birthday. We who struggled to start this now flourishing association will always remember the kind co-operation we received from you and from the organization of which you are the head. I hope it is as gratifying to you as it is to us to know that the association which has labored so earnestly for adequate industrial preparadness is progressing in such a splendid way. Sincere good wishes for your continued health, prosperity and opportunity for usefulness."



James H. McGraw

HERBERT HOOVER, Secretary of Commerce—"Please convey to Mr. McGraw my most hearty congratulations. For over forty years Mr. McGraw has been performing a great service to industry. He has had a real part in building the great structure of better living and comfort in our country. I know his friends all wish him a long continuance in service."

ELBERT H. GARY, chairman of the board, the United States Steel Corporation, and chairman of the advisory board of the New York Ordnance District—"On behalf of your associates on the New York Ordnance Advisory Board, I wish to extend to you our best wishes for continued good health, happiness and prosperity. Your forty years of devoted service to the best interests of engineering and industry is a matter of general knowledge, but your valuable contributions to the cause of national defense, particularly in sponsoring the movement for industrial preparedness, is known to but a limited circle. I want you to know, however, that the members of the Advisory Board appreciate the assistance rendered by your publications, under the inspiration of your personal interest and leadership."

OWEN D. YOUNG, chairman of the board of the General Electric Co.—"Deeply regret my inability to join your other friends at your dinner tonight. All of us in the electrical industry would like to pay our personal tribute to you and make grateful acknowledgment of your service to the industry."

THOMAS A. EDISON—"Sorry I can not attend testimonial dinner to Mr. McGraw. I admire him greatly for what he has accomplished. Through sheer ability and indefatigable hustling he has permeated the entire electrical art and industry, and richly deserves the honor you will show him tonight. Please extend to him the good wishes of a brother half-Scotchman and convey my greetings to all present."

DWIGHT F. DAVIS, Secretary of War—"The War Department recognizes the substantial help it has received from you personally and from the organization of which you are the head. In the program for effecting a reasonable degree of industrial preparedness in the United States, your various publications have by editorial support and by printing articles of great informative value, interpreted policies of the War Department to American industry. As a result of these activities much greater progress has been made than would otherwise have been the case. Your work as a member of the Advisory Board of the New York Ordnance District under the Chairmanship of Judge Gary has had a beneficial effect of national scope. I want to take advantage of the occasion of your birthday to let you know we appreciate your example of practical patriotism."

JOHN HAYS HAMMOND — "Please convey to your honored guest my regret

that I cannot be present at the testimonial banquet. I am on a committee of the people of the District of Columbia who are giving, this evening, a dinner in honor of Cuno H. Randolph, retiring president of the Board of Commissioners of the District. This prevents my going to New York as a mark of the high admiration and affection for our friend James H. McGraw."

Willits B. Sawyer, president of the American Electric Railway Association, was the first speaker. He reviewed the growth of urban transportation and paid tribute to service rendered to this growth by Mr. McGraw and his publications. The co-operation of Mr. McGraw's organization and his magazines, and Mr. McGraw personally, had been of inestimable value to the electric railway industry in the years during which it has faced its most serious problems, said Mr. Sawyer.

Charles L. Edgar, president of the Edison Electric Illuminating Co., of Boston, dwelt on the value of co-operative effort and brought out the effort that Mr. McGraw has put forth in furthering co-operation in the electric industry. He differentiated between Mr. McGraw's desire to help, rather than an ordinary willingness. On the subject of journalism, Mr. Edgar said that the McGraw-Hill publications represented what was the best in journalistic effort. He said that Mr. McGraw had the happy faculty of making the chiefs of industry work for his papers.

The electric manufacturing industry was represented by Gen. Guy E. Tripp, chairman of the board of the Westinghouse Electric and Manufacturing Co. General Tripp spoke of the high qualities of Mr. McGraw and paid great tribute to him as a friend, a business man and a part of the country's industrial life.

Suggests New Publication

General Tripp expressed the wish that the public might have a sounder conception of public utilities and suggested that Mr. McGraw add another publication to his already long list and devote it entirely to the sociology of business.

"I think you might be able to discover a philosophy in it which the rest of us have been too busy to find for ourselves," said General Tripp. "But, whether you do it or not, we still appreciate the great service which you have already rendered industry and thank you sincerely for it."

Dean Dexter S. Kimball, of Cornell University, spoke on behalf of the engineering profession. He sketched briefly the development of engineering and science in this country and praised Mr. McGraw's part in the dissemination of information on engineering through his many magazines. Referring to the prosperity of the United States, Dean Kimball said that the problem of distribution was the greatest now facing the country and that when it had been solved the general prosperity of the whole world, that we all look for, would be practically assured. He credited Mr. McGraw with an important part in this effort.

The last speaker was Edward J. Mehren, vice-president of the McGraw-Hill company, representing the publishing industry. He outlined the business principles of Mr. McGraw which are found exemplified in his many publications. He said that an ardent spirit of service, of faith, vision, courage and perseverance were the qualities which Mr. McGraw has brought to bear on his work and the work of his organization. Mr. Mehren concluded with this tribute to his chief:

"That he might build an institution that could valiantly serve engineering and industry, that could help lead them to higher ideals and greater effectiveness, that could help solve their baffling problems, that could make them better agencies for engineers, owners, managers, employees and the general public whom, in the last analysis, we all serve—such has been his ambition, such has been his very life."

Mr. McGraw Responds

Responding to the call of the toastmaster, Mr. McGraw thanked his audience for the tribute paid him, but insisted that the leaders of industry who so honored him were themselves worthy of commendation, for without their co-operation his efforts would not have borne fruit.

"It is beyond me to express my appreciation of this tribute of affection and good will," said Mr. McGraw.

"That there has been a certain accomplishment your tribute forces me to admit. I wish that the accomplishment might have been larger and that the service rendered to you, your professions, and your industries might have been even more intimate and effectual. But whatever the accomplishment, it would not have been possible without the ardent co-operation of two important groups:

"The first of these consists of my own loyal and competent associates in the McGraw-Hill Publishing Company, the McGraw-Hill Book Co., and their subsidiary organizations.

"The second group which has been essential to whatever accomplishment there has been, is composed in their entirety of the professions and industries which you represent. It has always been my thought that our publishing enterprises, both magazines and books, have been an intimate part of the professions and industries.

"A great satisfaction that I take out of this evening's meeting is, that it gives me an unusual opportunity to express in this public way my gratitude to the engineers and industrialists of America for the parts they have played in making possible McGraw-Hill magazines and McGraw-Hill books. Without you, our work could not have been done. Without you, our institutions could not have existed. I thank you heartily for your help, and believing as I do that our institution can be of still larger service, I pray your co-operation for the future.

"We have never wanted to stand alone in any effort if other agencies could help, nor did it matter whether we or someone else originated the idea. Our part would be played as vigorously in the one case as in the other. We have, therefore, co-operated with all agencies which have worked in a forward-looking attitude for the advancement of the engineering profession and industry; we have co-operated with the engineering societies, national and local, with trade and industrial associations of every kind; with government agencies; with research bureaus."

On his association with men in industry, Mr. McGraw said that the engineers and industrialists with whom he had worked had remade the physical conditions of the civilized world in these 40 years. "To work with you, and the thousands of your fellows whom you represent tonight, has been a source of constant inspiration," he said. "To serve you, to help you in your developments in engineering and industry has been an inestimable privilege."

In conclusion Mr. McGraw said: "For the privilege of having served in this ministry I have you to thank, for your co-operation has made it possible. With all my heart I thank you for the privilege. With all my heart I thank you for your tribute this evening."

Prominent Men on Committee

Among other prominent names on the committee that arranged the testimonial were:

W. L. Abbott, Prof. Comfort A. Adams, K. L. Ames, Jr., M. H. Aylesworth, George W. Bacon, Dr. H. Foster Bain, Dr. Thomas S. Baker, Bruce Barton, Dr. F. L. Bishop, W. H. Blood, Jr., Willis H. Booth, George L. Bourne, M. C. Brush, Dr. George K. Burgess.

Newcomb Carlton, C. C. Chesney, Paul S. Clapp, Henry J. Cochran, Barron Collier, George B. Cortelyou, Clinton H. Crane, H. S. Demarest, Alex. Dow, Dr. W. F. Durand, Charles L. Edgar, Thomas A. Edison, Dr. William C. L. Eglin, Louis A. Ferguson, Dr. John H. Finley, Dr. John Frazer, John R. Freeman, George W. Fuller, P. H. Gadsden, General George W. Goethals, Philip G. Gossler, Dean Arthur M. Greene, Jr., C. E. Grunsky, Herbert F. Gunnison, William F. Ham, General George H. Harries, James Hartness, Allen Hazen, Frank Hedley, E. M. Herr, Clemens Herschel, Dr. Charles H. Herty, Elon Huntington Hooker, Richard L. Humphrey, Dr. Alex. C. Humphreys, Martin J. Insull, Prof. Dugald C. Jackson, Major General Edgar Jadwin, Peter Junkersfeld.

Dean M. S. Ketchum, Dr. Dexter S. Kimball, Dr. George F. Kunz, F. A. Lidbury, John W. Lieb, Dr. A. D. Little, C. F. Loweth, Thomas N. McCarter, Clarence H. Mackay, Edward J. Mehren, Dr. R. A. Millikan, W. S. Murray, Dr. William H. Nichols, Dr. J. C. Olsen.

J. F. Owens, J. H. Pardee, Rembr,andt Peale, Dean George B. Pegram, Lewis E. Pierson, Dean A. A. Potter, Auguste G. Pratt, Charles F. Rand, Dr. Charles L. Reese, John V. W. Reynders, Dr. Calvin W. Rice, Dr. C. R. Richards, Robert Ridgway, John D. Ryan, A. L. Salt, William Lawrence Saunders, Willits H. Sawyer, Prof. Charles F. Scott, Charles Scribner, George T. Seabury, J. N. Shannahan, J. Waldo Smith, Elmer A. Sperry, John F. Stevens, Dr. S. W. Stratton, Ambrose Swasey, Samuel A. Taylor.

Dr. John E. Teeple, Maxwell M. Upson, Worcester Reed Warner, S. D. Warriner, William E. Wickenden, William J. Wilgus, R. S. Young.

S.A.E. Proposed Standards Ready for Acceptance

It is expected that the proposed standards on T-slots, their bolts, nuts and cutters will be accepted by the Society of Automotive Engineers at the annual meeting in January. The production division of the society has approved the report, which is the first one relating to production machinery used by automotive manufacturers to be so issued. The National Machine Tool Builders' Association and the American Society of Mechanical Engineers will probably accept this report also. The recommendations agree closely with good practice in machine tool construction, except for the fact that the throat of the proposed T-slots is somewhat greater than the nominal bolt diameter, which is current practice. Sufficient clearance for oil and chips and for the free-sliding of the T-bolts in their slots has been provided.

The iron and steel division has recommended that the manganese range of S.A.E. steel 1046 be raised from the present 0.30 to 0.50 per cent to 0.40 to 0.60 per cent as requested by the American Gear Manufacturers' Association. This steel is used for streetcar gears and hence it is not strictly an automotive steel. For this reason no recommendation as to combined manganese and carbon content was made, though requested by the A.G.M.A., because such a recommendation would not conform with other S.A.E. specifications. The carbon range still stands at 0.40 to 0.50 per cent. The phosphorus and sulphur content are subject to further consideration.

The iron and steel division confirmed the letter-ballot approving the Rockwell hardness tests. Some minor changes in the wording are to be made, however, before final recommendation is made to the standards committee. The division also approved the recommended heat-treatments of the molybdenum S.A.E. steel 4615, which is primarily intended for case hardening.

The screw threads division recommends that high nuts, p. C3f of *S.A.E. Handbook*, be chamfered to the maximum angle of 40 deg. with the top face of the nut. No specification on this feature is included in the present standard but it is felt that a maximum limit should be included to prevent cutting down the sides of the nuts too deeply, thus defeating their purpose, which is to provide a long wrench hold.

Standard Frame Dimensions for Electric Motors

A general conference of those interested in the subject of standardizing electric motor frames was held under the auspices of the American Engineering Standards Committee on Dec. 10. The meeting was the result of a request of the National Machine Tool Builders' Association to have the American Engineering Standards Committee consider the standardizing of certain dimensions of electric motor frames to secure interchangeability and to make it easier to apply motors to machinery of various kinds. C. E. Skinner presided and John Gaillard, of the American Engineering Standards Committee, outlined work that had already been done along this line in Europe. The machine tool builders were represented by E. F. DuBrul, E. J. Kearney, Thomas Jones and Benjamin Graves, who pointed out some of the difficulties arising from frequent changes in motor design and a complete lack of standardization of sizes. The necessity for this standardization has been so urgent that the machine builders may be forced to demand motors built to their specifications if some sort of a standard is not adapted by the motor builders themselves.

The demand for standardization was backed up by various departments of the U. S. Army, by a large railroad and by other users. The representative of the National Electrical Manufacturers' Association opposed the subject being taken up by a committee of the A.E.S.C. but was outvoted and a sub-committee has been appointed to report not later than Jan. 15, 1927.

The points on which standardization is desired are shaft height, bolt centers, bolt diameter and shaft diameter. It is also the purpose of the committee to consider the use of preferred numbers in establishing the standards.

Metric Hearings Bring No Encouragement to Proponents

After having devoted one day of its metric system hearings to testimony for such legislation, and one day to that of the opponents, the Senate Committee on Commerce, on Dec. 11, adjourned the hearings to a date to be fixed hereafter. Senator Copeland, of New York, a member of the committee, expressed the opinion that the committee will not consider the matter further. Nathan Williams, representing the National Association of Manufacturers, raised strenuous objection to the calling of new hearings on metric bills, when a perusal of the testimony which has been taken before other committees would convince most legislators that compulsory use of the metric system is not desirable. Such proposals, he pointed out, are dropped promptly by all committees as soon as the members hear the opponents, yet at nearly every session the matter is brought up anew and industry is required to go to the expense of sending prominent witnesses to Washington to defend itself against a proposal that would undo all that has been done in the program of simplification and the reduction of excess variety.

Mr. Thom, representing the Association of Railway Executives, declared the proposed legislation is unconstitutional and pointed out that it would call for staggering expenditures on the part of the railroads alone.

C. C. Stutz, secretary of the American Institute of Weights and Measures, also appeared before the committee. He told of the confusion which exists in countries using the metric system and cited some of the organizations which are opposed to a change from our present system.

Hoover Sees U. S. Supreme in Air Development

A picture of a United States supreme in air services, with private pilots and planes forming an invaluable adjunct to the air forces of the military arms of the Government was drawn by Secretary of Commerce Hoover, in a statement issued last week.

Declaring that the Commerce Department's plans to facilitate air transportation have progressed far beyond the hopes of officials, Mr. Hoover said that as soon as contracts for the air mail service are let by the Post Office Department, the nation will have between 8,000 and 9,000 miles of privately operated airways. This total, he said, is expected to reach 10,000 miles by July 1, 1927.

Original department estimates provided for 4,000 miles of regularly operated airways to go into service during the next fiscal year, but estimates have been raised to 10,000 miles on the basis of development since the estimates were drawn. The department is asking $4,000,000 to provide lights, plane inspection, emergency landing fields, maps and radio beacons.

Mr. Hoover predicted that the development of air navigation in America will be in the direction of supplying air and express transport rather than in transportation of passengers, which is the chief business of the subsidized European aircraft operating companies. In this connection he said that, although the Philadelphia-Washington air service operated during the latter months of the Philadelphia Sesquicentennial Exposition was not a financial success, the line may be continued through Georgia to New Orleans.

Mr. Hoover drew a parallel between European privately operated air services and the future development of privately operated routes in this country. All the privately operated routes in Europe are subsidized, he said, while "we are trying to build them up without subsidy by the Government."

Guggenheim School to Have Modern Air Tunnel

New York University is now arranging for the installation, in its new Daniel Guggenheim School of Aeronautics, of a wind tunnel which, when completed, is expected to represent the most up-to-date equipment for testing airplane models. Air velocities in the tunnel will, it is estimated, exceed 100 miles per hour. The college of engineering already has available for aeronautical study a four-foot wind tunnel of the type used by the British National Physical Laboratory, in which experimentation is conducted up to air velocities of 60 miles per hour.

This tunnel will be of the double-return type, having a diameter of 9 ft. at the working section and an overall length of 110 ft. It will be employed for the testing of airplane and airship models, for the study of aerodynamics or the science of air flow and for problems in ventilating and heat transference.

The Business Barometer

This week's outlook in Commerce, Finance, Agriculture and Industry based on current Developments

By Theodore H. Price
Editor, *Commerce and Finance, New York*

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IN ITS broader aspect the most important happening of last week is to be found in the fact that Mussolini, speaking in Rome, was distinctly heard in Chicago. The annihilation of distance thus effected attests the rapid progress that is being made in the unification of the world, and when considered in connection with the announcement that we will shortly be able to talk with London on the telephone it has tremendous significance for the economist who looks forward to the time when international trade will be unobstructed by the barriers which national prejudice and a mistaken self interest have erected.

At all events it is plain that we must look well below the surface to find an adequate explanation of the change that has recently come over the markets in which the public registers its expectation of the future by buying or selling.

From having been lethargic and hesitant the stock market has suddenly become almost buoyant. Of course its strength may have been partially due to the operations of insiders who had some preknowledge of the stock dividend of 40 per cent that the United States Steel Corporation announced, but it will not do to say that a movement so broad is entirely or even chiefly the result of the action of a board of directors in voting an increase in the number of shares issued against assets whose value is unaffected. The whole cannot exceed the sum of all its parts, and the value of stock dividends is chiefly sentimental in that they bespeak confidence in the future prosperity and earnings of the corporation on whose behalf they are declared.

If the market shall continue to advance now that the steel corporation has declared the stock dividend that has been so long expected, then it will be safe to assume that some unseen influence is working to sustain the unprecedented prosperity that this country is enjoying. But careful circumspection meantime will be wise, for there are many things which suggest that we may be nearing the end of a cycle for which there are no precedents.

One is the altitude that security prices have attained. It is by far the highest on record. Another is the continued decline in bank clearings. For the week ending Dec. 8 they were 8.3 per cent under last year.

Still another is the increase in business failures and bank suspensions. The former continues to run slightly ahead of last year, and the New York *Journal of Commerce* says that the bank suspensions in the United States during 1926 will number 850 as compared with 777 in 1925.

These are the statistical debits in the nation's balance sheet of business. The credits are an unprecedented volume of life insurance, a remarkable growth in savings bank deposits, a winter tourist movement that promises to be enormous, the increased consumption of cotton at low prices, the continued abundance of credit, and November exports of merchandise which were valued at $481,000,000 and exceed last year by $34,000,000, while imports, valued at $376,000,000, are practically the same as in 1925.

There are other items in the account, but those mentioned are the most important and in the aggregate the debits and credits come very near to offsetting each other. The balance to be carried forward will therefore be small, and the record of 1927 will depend upon that year's developments.

To the probabilities a clue will be hard to find during the holidays. The retail stores report a good business, but it would be bad salesmanship to admit the contrary. There are nevertheless some indications that people are buying more carefully and the theaters in both New York and Chicago are complaining that their audiences are disappointingly small. But wholesale trade is fully up to the average which is always low during the last half of December, and the chain stores claim to be doing more business than ever.

On the commodity exchanges a lack of initiative and activity is noticeable, although cotton has exhibited surprising strength when the size of the crop is considered. Sugar has been quiet. The old crop is nearly all sold and the trade is waiting to see whether President Machado really means what he says. If the Cuban crop is kept down to 4,500,000 tons higher prices would seem to be inevitable.

In Congress the fight over farm relief is centered around the new McNary bill, which contemplates that the Government should provide a revolving fund of $250,000,000 out of which loans shall be made for use in stabilizing the value of cotton, wheat, corn, hogs and rice. Any direct effort to control prices is disavowed and the stabilization is to be effected by the use of the credits granted, for which reimbursement is to be made out of the "equalization" fees collected on the surplus exported or otherwise disposed of.

The British Parliament has been prorogued until Feb. 8, and the Liberals will probably employ the interval fighting over their "war chest" which is said to contain £1,000,000 and is now controlled by Lloyd George. The British government continues to carry on stolidly meanwhile. On account of the war debt due the United States it paid $92,950,000 last week.

What's Doing in Industry

There is little to fire the imagination in discussing present machinery and machine tool business. Conditions are "spotty" and the trend is neither up nor down. Sales in some localities are ahead of last month, while in others a dull state of affairs prevails. Inquiries continue to come to manufacturers and dealers, but most quotations on these will not be made until after the new year.

Suspension of automotive activity continues to be felt in Detroit, where hand-to-mouth buying of single tools furnishes the only business. General conditions in Chicago are on a low plane, with orders scarce but the outlook is good. Cincinnati has experienced a slight lull, only scattered orders for small pieces breaking the monotony of a slow week. Orders have dropped off in Milwaukee, but some recent export business has brightened hopes. Sales are quiet in Cleveland, but inquiries point to an active quarter after the holidays.

The New York market continues fair, current business being in good volume and inquiries for the new year plentiful. Demand is quiet in Buffalo but much business is pending. Activity is proceeding satisfactorily in Philadelphia but a good deal of business is being held over until after January first. New England has struck the usual preholiday slow down but a favorable reaction is assured within a few weeks.

Recent events have stimulated the stock and commodity markets and it seems safe to assume that prosperity will continue. But careful circumspection in the meantime will be wise, for there are many things that suggest that we may be nearing the end of a cycle for which there are no precedents.

The Industrial Review

Progress of the machinery and machine tool business in various parts of the country

THE following reports, gathered from the various machinery and machine tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

Chicago

Conditions in the machine tool market are on a lower plane than for the last several weeks. Little buying is being done, either of new or used machinery, and the situation is not expected to improve during the remaining two weeks of the year. The holiday season, and the general taking of inventories are two of the factors which are held responsible for the decline.

There is no feeling of depression in the trade, and inquiries for machinery equipment for future delivery indicate there will be an improvement after January first. Little effort is being made to effect immediate sales on the part of the leading machine tool houses, but salesmen will start out the first week of next month with a feeling of optimism.

The Illinois Steel Co. has practically closed its entire list, but the Pullman Car and Manufacturing Co. has yet to be heard from with respect to closing. Railroads are not in the market for equipment at this time, and little is expected from this source until after the 1927 budgets are made up. An announcement that automobile manufacturers will increase their production earlier than usual creates the belief that there shortly will be a stimulated demand for such tools as are chiefly employed in the shops of that industry.

Buffalo

Machine tool trade conditions here remain unchanged. The demand is quiet, although some inquiries are being received that will doubtless produce some business early next year. Conditions, however, are normal and dealers are optimistic, believing that 1927 will produce good business. There is general satisfaction apparent regarding the business of 1926.

Conditions in the electrical equipment end of the business also continue to be quiet. Perhaps the greatest activity is in the demand for contractors' equipment, of which that used in snow removal is receiving by far the most attention. There is no activity locally by the railroads.

Cincinnati

Taking the Cincinnati machine tool market as a whole, there has been a slight lull in the past week. A few manufacturers, however, report that they made a slight gain in sales and several others report that they held their own. With the selling agencies the experience is about the same as that of the manufacturers.

Trade conditions are regarded as satisfactory, taking the season of the year into consideration. Inquiries are coming in freely from all parts of the country, and the outlook is regarded both by manufacturers and by agents as being in every way encouraging.

The week's sales were well scattered over the country and the purchases were well diversified as to sizes and types of tools. There were some orders that called for several tools, but the major part of the week's business was made up of orders for single tools.

Concerns in the automotive industries did little buying in the week, but a feeling prevails that this field is about to open up. Railroads did some buying against lists recently sent out and further purchases are expected from this source.

The feeling is that the market will become much more active after the holidays are over and when next year's appropriations for necessary equipment have been made. Machine tool manufacturers have sufficient orders booked to keep their plants busy for quite a while.

New York

Business continues at a fair rate in this market. December will probably close with a volume of orders on a par with last month and the year as a whole should surpass 1925. Inquiries are active but most of the current quotations are for prospective business in 1927. Orders being placed now are for machines that have been pending for some time, and which buyers desire to have included in this year's purchases. One order of this type was received in the past week from the Illinois Steel Co. and included 3 planers, 2 lathes, 2 boring mills and 2 radial drills.

The exposition of power and mechanical equipment in New York brought business to some firms. The Triplex Machine Tool Co. sold two of its Swiss jig boring machines, and also 2 filing machines, 3 gear hobbing machines and a bench lathe.

The Standard Oil Co. has issued a list for equipment for one of its plants. The requirements include punches, a steam hammer, lathes, shapers, radial drills, a power hacksaw, a milling machine and a grinder. All this equipment is to be purchased before the end of the month.

Most dealers and agents in this territory are frank in stating that little is expected in the next week as the holiday spirit seems to have that effect.

Cleveland

Due to the pre-holiday season and inventory time, sales of machinery and machine tools have reached a low ebb in the local market. A few orders for single replacements was about the only business closed during the last two weeks. Sales for December to date are well below November, one of the poorest months of the year. A revival of buying is expected to take place around the middle of January.

The used machinery market is more active. Sales of the better class of tools are easily made.

Some encouragement to the machine tool industry is seen in predictions made recently by leaders in the Cleveland automobile field that 1927 will be a year of record production in the automotive industry. Easier prices for steel and no price boost for tires is expected.

Detroit

There has been little change in market conditions in the machine tool and machinery field during the past week, business remaining dull and spotty with only a few orders for single machines and replacements.

The inventory season in the automobile industry has meant practical cessation of buying, but shortly after the first of the year things should open up.

The present hand-to-mouth buying indicates that only immediate needs are being taken care of at present. No large lists are out but it is generally known that several automotive and accessory plants are planning on extensions which will require much in the way of new equipment.

The demand for contractors' machinery is fairly active, while the railroads are commencing to buy against lists already in the hands of machine tool and machinery representatives. More businses from both of these sources is expected in January.

Cadillac and Packard are buying some machinery for general production purposes, while the Continental Motors Corporation is tooling up for a large order recently received. The General Motors plants at Pontiac, including the Oakland factory and the new plant for the manufacture of the Pontiac, are among the heaviest buyers of equipment just at present.

Milwaukee

Business in metal working equipment is feeling the usual effect of the close of a year and the proximity of the holiday period. The first part of December was notable more for the number of inquiries than the volume of new business booked. The tone and quantity of inquiries is accepted as an augury of business improvement early in January. Caution and conservatism are somewhat more pronounced than at this time a year ago.

Export demand, while not considerable, and at present lighter than during the earlier months of the year, continues to develop in an encouraging manner. Scattering orders from railroad shops likewise help to impart some degree of activity. General industrial demand is maintained at a relatively satisfactory rate.

New England

A slowing up in volume of orders booked and a decrease in the number of inquiries has appeared in the machinery building industry of New England during the past week or ten days and this is attributed to the season. The buying that has been observed has largely been of machinery of the special production class and there has been a fair amount of this. In fact all year long production machinery sales have been excellent.

There has been some buying of machine tools and hand tools. Standard equipment trade is dull, although last minute orders have come in and some of this is judged to be business to be included before closing inventories.

While December business has not been so good, manufacturers have not changed their attitude concerning conditions. In fact practically all anticipate a favorable trade condition in the first six months of the coming year.

Philadelphia

Reports from machinery and machine tool dealers and manufacturers in Philadelphia indicate that business during the last two weeks proceeded along satisfactory lines with the usual end-of-the-year lull so far as large orders were concerned. Those firms which deal with the automotive trade reported there had been only small orders during the last two weeks, but inquiries indicated larger orders were in prospect for early in the New Year.

Manufacturers specializing in heavy machinery for railroad equipment are operating their plants at about 60 per cent of capacity. Prospects for early purchase by the railroads for new equipment to take care of a large business anticipated for 1927, appear to be bright.

Small tool manufacturers reported a falling off in orders during the last fortnight.

Business Men's Council Aids War Office

The advice and assistance received from the War Department Business Council, which has just terminated its annual meeting in Washington, is proving of great value in the administration of the procurement branches of the Army. The men who compose the War Department Business Council are the heads or higher executives of some twenty of the leading industrial firms of the United States. They come to Washington at their own expense to inspect and advise as to the purchasing organizations and methods of the various supply branches of the Army, thus making available to the Army services which would be beyond the reach of any one commercial organization.

The fact that such an organization is in active operation is an indication of the efforts of the War Department to modernize and bring to the highest point of efficiency its business administration.

At the meeting of the council held this month, the council declared that present personnel, organization and methods of the Army supply branches are equal to those found in large corporations, and that the War Department's goal of "making every dollar do its full duty" is being rapidly approached.

One of the constructive acts of the council at this meeting was the suggestion for changes in the administration of certain details in connection with the War Department's present practice of consolidated purchasing which has been so successful.

Tractor Builders Will Take Test in Russia

International tractor tests in which all the principal foreign manufacturers, including those of the United States, will be invited to participate, will be held in Russia in the spring. The principal tests will be held in the Northern Caucasus and the Crimea. They will be held under official auspices and awards will be made.

The Soviet Union has purchased tractors and parts valued at $10,536,155 in the United States during the past two years. Of the 22,000 tractors now operating on farms in the Soviet Union, the great majority are of American manufacture.

The tests will include work with plows, cultivators, harrows, seeders, mowers, reapers, threshers and other tractor implements.

Trade Statistics to Help Avoid Booms

The committee on collection of business figures, sponsored by the United States Chamber of Commerce and headed by Owen D. Young, chairman of the board of directors of the General Electric Co., met in New York on Dec. 8 to discuss ways and means of ironing out violent price fluctuations.

Forecasts were made by the group of representative business men present that the day will come when American business will be conducted on the basis of national figures gathered by the Government and other large national agencies.

Working along lines first suggested by Herbert Hoover, Secretary of Commerce, this committee has been working to eliminate the waste caused by periodic booms and depressions. Throughout its work it has had three main objectives before it, namely, the preparation of a census of distribution, periodical collection of quantity and price figures, and figures on the condition of retail trade.

It is believed by the committee that through a wide-spread publication of business figures as familiar as the United States population census, the violent price fluctuations which have marked the booms and depressions of the nation's business history will largely be eradicated.

German Auto Show Introduces Many Modern Trends

An appreciable increase in the number of six-cylinder automobiles in passenger car design in Germany was apparent in the displays at the annual show of the German automobile industry, which was held recently in Berlin.

Fifty-four types of passenger car motors were on exhibition at the show, of which two were eight-cylinder cars, 26 six-cylinder, 24 four-cylinder, 1 two-cylinder and 1 one-cylinder. Fifty-four types of truck motors and twenty-five motorcycle motors also were on exhibition. A good proportion of the motors displayed were of the overhead valve system of operation. Left-hand drive method is growing in favor in Germany and 20 of the chassis shown at the show were equipped with that type of control. Practically all of the passenger cars displayed at the show had four-wheel brakes and low pressure tires.

The outstanding novelty of the show was the Rumpler four-cylinder front wheel drive car. This car has a four-cylinder motor of 80x130 mm. bore and stroke. It drives through the front wheels and has a swinging front axle. The three speed gear box is directly in front of the motor and the differential is over the middle of the front axle. There is a universal joint on each side of the axle and separate steering for each wheel. The frame is made of light metal and the weight of the touring car is reported to be about 2,530 lb. Its wheel base is 126 in. and the price quoted was equivalent to about $2,500.

Most of the trucks on exhibition at the show were four-cylinder shaft-drive cars, although a few had the chain system of drive. The light truck is gaining in popularity in Germany and fourteen models on display were of one ton or less capacity.

Concurrently with the show of the German automobile industry, the annual exhibition of foreign motor cars was held in Berlin. Thirty makes of foreign cars were on exhibition at that show, sixteen of which were of American make.

Machinery Industry in Connecticut Grows

Machinery building and foundry work in Connecticut is growing in number of employees and value of production, but with a fewer number of establishments. The industry as a whole, had a profitable year in 1926 and reports indicate increased production and better earning rates. Immediately following the war the machine industry carried along under the handicap of excessive war production, a condition which now appears fully past.

This industry in Connecticut forged ahead with great strides during the war period and, measured by the value of production, jumped from fifth position of importance, to second place in 1923, pushing aside the silk, cotton and hardware industries.

Prior to the war there were 239 machinery and foundry establishments in Connecticut and ten years later there were 210. Wage earners increased in the same period from 15,114 to 22,237. In the United States there are 8,531 establishments and 448,777 employees, so that nearly 5 per cent of the mechanics are in Connecticut. Wages increased in Connecticut from $8,724,752 to $26,131,861 in ten years. The value of machine products in Connecticut jumped from $24,558,098 to $84,386,-621, or 137 per cent, in ten years. The yearly payroll in the country in 1923 was $642,431,000 of which Connecticut's ratio was 4.96 per cent and the value of production in the country at large was $2,337,072,775 of which Connecticut's ratio was 3.61. The ratio of wages to production in Connecticut was 35.53 per cent in 1914, and 30.97 per cent in 1923. In the country this ratio was 27.49 per cent.

Danish Automobile Show Planned for February

At a recent meeting of the Danish Automobile and Cycle Wholesalers' Association it was decided that the annual Danish exhibition of automotive products is to take place sometime during the month of February, 1927. The growing importance of Copenhagen as a center for the distribution of automobiles and other automotive products in Scandinavia and the Baltic, accounts for the great interest with which native dealers, as well as foreign manufacturers, are looking forward to this show. The exhibition will embrace motor vehicles of all kinds as well as cycles.

Report on Magnesite Ready for President

The report on magnesite, being prepared by the U. S. Tariff Commission, is in the hands of the commissioners. This means that the engineers and the other members of the staff have concluded the laborious investigation which must be made in order to give a clear picture of the situation to the commissioners and to the President.

An increase in the present duty is being sought by domestic producers who have lost part of their market.

Personals

JOHN E. DORAN, of Cincinnati, received a gold watch on his retirement as president of the Engineers' Club.

FRANK E. ARTZ has acquired the exclusive sales agency in the Chicago territory for Demco high-speed sensitive drill presses.

W. W. TANGEMAN, Sales Manager of the Cincinnati Milling Machine Co., has been appointed a member of the executive committee of the Machine Shop Practice Division of the American Society of Mechanical Engineers.

M. E. MATTSON, formerly Chicago representative for the Norton Co., has been appointed district manager of the machine division in the Cleveland office.

L. H. LINK, of Fort Wayne, secretary of the Bass Foundry and Machine Co., of that city, has been elected president of the Indiana Manufacturers' Association.

L. C. MORROW, Managing Editor of the *American Machinist*, has been elected chairman of the executive committee of the Machine Shop Practice Division of the American Society of Mechanical Engineers.

H. D. GENTRY, formerly with the Moline Tool Co. and the National Automatic Tool Co., and F. A. Bennett, formerly associated with the Remington Arms Corporation, have become associated with the Marshall & Huschart Machinery Co., of Chicago.

R. E. FLANDERS, of the Jones & Lamson Machine Co., has been re-elected chairman of the Committee on Publications of the American Society of Mechanical Engineers. He has also been elected a member of the board of managers of the society.

EDWIN D. NICHOLS, for the past 24 years associated with the R. K. Le Blond Machine Tool Co., and recently in charge of that company's railroad sales development, has become sales engineer for the Long & Allstatter Co., Hamilton, Ohio.

ELMER G. PAULY, of Baltimore, has been appointed trade commissioner for the Department of Commerce at Melbourne, Australia. He is at present assistant manager of the commerce district office in New York, but will sail for his new post soon after the first of the year.

ALBERT L. HEINSS, formerly superintendent of the Knox Engineering and Manufacturing Co., of Columbia City, Ind., has purchased that company and will proceed with the manufacture of punching and shearing machinery, and bending and straightening rolls.

D. F. NOBLE has been appointed sales representative in the Chicago and Milwaukee territory for the Foote-Burt Co., of Cleveland. He is also representative in that territory for the Rockford Iron Works and for the Chard Lathe Co. He has established offices at 518 Machinery Hall, Chicago.

HIRAM N. CUDWORTH has retired as manager of the machine division in Chicago for the Norton Co., Worcester, Mass. Mr. Cudworth had been associated with the Norton company for the past twenty years, mostly in the Chicago territory. He has been succeeded in Chicago by Oscar E. Nordstrom, formerly assistant manager of the Cleveland office of the company.

ROBERT S. GLENN, manager of the New York store of the Cleveland Twist Drill Co., has been appointed assistant to the president, Jacob D. Cox, Jr., with headquarters in Cleveland. Oliver B. Hansen succeeds Mr. Glenn in New York, and Irving P. Farnum, for several years representative in Chicago, has been appointed representative in the Southeastern territory, succeeding Mr. Hansen.

FRED A. GEIER, Cincinnati machine tool manufacturer, has been appointed a member of the Board of Directors of the Cincinnati Branch, Federal Reserve Bank, to fill the vacancy caused by the recent resignation of A. E. Anderson. Mr. Geier long has been prominent in financial, industrial, and civic affairs in Cincinnati. He is president of the Cincinnati Milling Machine Co. and a director of the Lincoln National Bank. Mr. Geier's appointment was made by the Federal Reserve Board on the recommendation of the Cleveland Federal Reserve Bank.

John Steptoe Shaper Co. Sold to Western

Announcement has been made of the sale of the John Steptoe Shaper Co., of Cincinnati, to the Western Machine Tool Works, of Holland, Mich. The sale includes the entire assets of the Steptoe company and gives the Western company the right to continue the manufacture of the complete line of Steptoe shapers from 14 to 24 in. Parts for shapers already in use will also be manufactured and distributed as heretofore.

Business Items

Rummins & Murray, Inc., will represent the Wetmore Reamer Co., of Detroit, in the Michigan territory, after Jan. 1, 1927.

The Pacific Coast Founders Association has established offices at 815 Sharon Bldg., New Montgomery St., San Francisco, Calif. D. B. Hinckley is commissioner.

The Gogan Machine and Foundry Co., Inc., of Cleveland, is constructing an addition to its plant. This new building will afford additional facilities for the manufacture of the company's shaft heat-treating machines and automobile accessories.

The Iron Products Corp., of LaCrosse, Wis., has announced the acquisition of the entire business, plant and property of the James Foundry Co., also of LaCrosse. The plant and business will be operated as a gray iron casting division.

The Superior Spike Co., Inc., has been organized at Marysville, Kan., to manufacture a recently patented spike for use on railroads. James W. Reynolds, inventor of the spike, C. E. Ennis and Carl Ball are the incorporators.

Equipment of the Superior Die, Tool and Engineering Co., of Michigan City, Ind., was sold recently at auction by a receiver. Chicago and Michigan City manufacturing concerns bought the machinery. The realty was not sold, as it did not comprise any of the assets of the company.

Articles of incorporations have been filed in Indianapolis by the Tital Electric Co., of Butler, Ind. The company will manufacture electric motors and steel specialties. The incorporators are W. F. Roberts, A. M. Sicard, J. O. Oberlin, L. C. Harding and H. C. Springer.

The Griffin Wheel Co., of Chicago, a subsidiary of the American Steel Foundries Co., has purchased the Standard Car Wheel Co., of Cleveland, and the St. Bernard Manufacturing Co., of Cincinnati. The Griffin company will combine the production of these plants to take care of a proposed expansion.

Obituaries

GEORGE STENZEL, of George Stenzel & Co., representatives in Germany of a number of large American manufacturers, died on Dec. 18.

R. A. BOEHM, inventor of the Rickert-Schafer die head, died last week. Mr. Boehm had retired from active business a few years ago.

HARRY M. GILES, general superintendent of the South Philadelphia Plant of the Westinghouse Electric & Manufacturing Co., died on Dec. 14, at the Hotel Dennis, Atlantic City, as a result of heart trouble. The funeral services were held Dec. 17, in the Swarthmore Presbyterian Church, Swarthmore, Pa. Mr. Giles, who was 57 years old, had been associated with the Westinghouse Co. since 1900. He began his career as a testing engineer with the Corliss Steam Engine Co., Providence, R. I. He was later associated with the Calumet & Hecla Mining Co., as chief engineer.

Calendar of Local Meetings

National Association of Cost Accountants

San Francisco Chapter. Dec. 27. Preparation for Inventory.

Hawaii Chapter. Dec. 28. "Process of Starch Extraction from Canna Root," by W. L. Doty.

Boston Chapter. Jan. 20. "Standard Costs," by Eric A. Camman.

Buffalo Chapter. Jan. 27. "Co-ordinating the Factory and General Accounts to Insure Prompt Monthly Closing," by John E. Horn.

Chicago Chapter. Jan. 20. "Fixing Material Standards as a Basis for Standard Costs," by W. L. Churchill.

Cleveland Chapter. Jan. 19. "Distribution Costs," by F. L. Sweetser.

Detroit Chapter. Jan. 27. "Standard Cost Accounting for Automobiles," by G. Charter Harrison.

Erie Chapter. Jan. 17. "Department Burden, Overhead and Selling and Administrative Cost," by C. H. Scovell.

Hawaii Chapter. Jan. 25. "Mercantile Accounting," by C. P. Benton.

Hartford Chaper. Jan. 18. "Debatable Subjects of Mutual Interest to Foremen, and Team Work between Foremen," by H. G. Crockett.

Kansas City Chapter. Jan. 17. "Where the Cost Accountant and Engineer Meet."

Los Angeles Chapter. Jan. 18. "Costs of Selling."

Milwaukee Chapter. Jan. 20. by F. H. Elwell.

Philadelphia Chapter. Jan. 21. "Building and Loan Association," by Edward P. Moxey.

Providence Chapter. Jan. 10. "Distribution Costs." by M. E. Abbot.

Rochester Chapter. Jan. 19. "The Business Outlook for 1927," by J. C. Howell.

St. Louis Chapter. Jan. 18. "Appraisals and Their Relation to Costs," by H. G. Baldwin.

San Francisco Chapter. Jan. 24. "Developments of Budgetary Control."

Scranton Chapter. Jan. 25. "Transportation and Tonnage Taxes," by P. A. Kennedy.

Springfield Chapter. Jan. 19. "Business Outlook for 1927," by Ray Vance.

Syracuse Chapter. Jan. 18. "Why Systems Fail," by Robert Anderson.

Twin Cities Chapter. Jan. 18. "How-We-Do-It in Department Stores," by W. A. Dillman.

Forthcoming Meetings

American Association for the Advancement of Science. Annual meeting University of Pennsylvania, Philadelphia, Pa., Dec. 27 to Jan. 1. Sam Woodley, executive assistant, Smithsonian Institution, Washington, D. C.

American Engineering Council. Annual meeting, Hotel Mayflower, Washington, D. C., Jan. 13 to 15. A. C. Oliphant, assistant secretary, 26 Jackson Place, Washington, D. C.

American Society for Steel Treating. Winter Sectional Meeting, Washington, D. C., Jan. 20 and 21, 1927. W. H. Eisenman, secretary, 4600 Prospect Ave., Cleveland, Ohio.

Society of Automotive Engineers. Annual meeting, Detroit, Jan. 25 to Jan. 28. W. Delchamps, chairman, meetings and sections department, 29 West 39th St., New York.

The Weekly Price Guide

Rise and Fall of the Market

HIGHER prices of finished steel shop materials are not in immediate prospect, yet at the same time, further reduction in quotations seem equally improbable, despite active demand for several items. Fairly large buying is noted in car materials, track supplies, rails, structurals, automotive sheets and bars, tin plates, steel plates, galvanized steel sheets, and lapweld pipe. Non-ferrous metals prices continue on the down-grade. Linseed oil dropped 1½c. per gal. (7½-lb.) during the week.

(*All prices as of Dec.* 17)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI	
No. 2 Southern	$24.19
Northern Basic	20.89
Southern Ohio No. 2	21.39
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 2.25@2.75)	26.37
BIRMINGHAM	
No. 2 Foundry	20.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	23.76
Virginia No. 2	28.19
Basic	21.26
CHICAGO	
No. 2 Foundry local	21.00
No. 2 Foundry, Southern (silicon 2.25@2.75)	24.55
PITTSBURGH, including freight charge ($1.76) from Valley	
No. 2 Foundry	20.76
Basic	20.26
Bessemer	21.26

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	5.00@5.25
Cleveland	5.00@5.25
Cincinnati	5.00@5.50
New York	5.25@5.50
Chicago	5.25@5.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots.

Blue Annealed	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.30@2.40	3.50	3.25	3.89
No. 12	2.35@2.45	3.55	3.30	3.94
No. 14	2.40@2.50	3.60	3.35	3.99
No. 16	2.50@2.60	3.70	3.45	4.09
Black				
Nos. 18 to 20	2.80@2.90	3.75	3.60	4.15
No. 22	2.95@3.05	3.90	3.75	4.30
No. 24	3.00@3.10	3.95	3.80	4.35
No. 26	3.10@3.20	4.05	3.90	4.45
No. 28	3.25@3.35	4.20	4.05	4.60
Galvanized				
No. 10	3.25@3.40	4.10	3.95	4.40
Nos. 12 to 14	3.35@3.50	4.20	4.05	4.50
No. 16	3.45@3.60	4.30	4.15	4.60
No. 18	3.60@3.75	4.45	4.30	4.75
No. 20	3.75@3.90	4.60	4.45	4.90
No. 22	3.80@3.95	4.65	4.50	4.95
No. 24	3.95@4.10	4.80	4.65	5.10
No. 26	4.20@4.35	5.05	4.90	5.35
No. 28	4.45@4.60	5.30	5.15	5.60

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	53%	39%	55½%	43½%	54%	41%
2½ to 6 in. steel lap welded	48%	35%	53½%	40½%	51%	38%

Malleable fittings: Classes B and C, banded, from New York stock sell at list plus 4% less 5%. Cast iron, standard sizes, 36-5% off.

Size, Inches	List Price per Foot	Diameter in Inches — External	Diameter in Inches — Internal	Thickness Inches
¼	$0.17	1.315	1.049	.133
⅜	.23	1.66	1.38	.14
½	.27½	1.9	1.61	.145
¾	.37	2.375	2.067	.154
1	.58½	2.875	2.469	.203
1¼	.76½	3.5	3.068	.216
1½	.92	4.0	3.548	.226
2	1.09	4.5	4.026	.237
2½	1.27	5.0	4.506	.247
3	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at warehouse in lots of less than 100 ft.:

Thickness — Decimal	B.W.G. and Fractions	Outside Diameter in Inches — ¼	⅜	½	¾	1	1¼	1½
		Price per Foot						
.035"	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049"	18	.17	.18	.19	.20	.21	.23	.25
.065"	16	.19	.20	.21	.22	.23	.25	.27
.083"	14	.20	.22	.23	.24	.25	.27	.29
.095"	13	.21	.23	.25	.26	.27	.29	.31
.109"	12	.22	.24	.26	.27	.28	.30	.32
.120" or .125"	11	.23	.25	.27	.28	.29	.31	.33
.134"	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Spring steel (light) (base)*	7.00	6.00@7.50	4.65†
Spring steel (heavier)	4.00	....	4.00
Coppered Bessemer rods (base)	6.05	6.00	6.20
Hoop steel	4.49	3.65	4.15
Cold rolled strip steel	6.25	6.35	6.25
Floor plates	5.25	5.30	5.00
Cold drawn shafting or screw	4.00	3.90	3.60
Cold drawn flats, squares	4.50	4.40	4.10
Structural shapes (base)	3.34	3.10	3.10
Soft steel bars (base)	3.24	3.00	3.00
Soft steel bar shapes (base)	3.24	3.00	3.00
Soft steel bands (base)	3.99	3.20	3.65
Tank plates (base)	3.34	3.20	3.10
Bar iron (2.90@3.00 at mill)	3.24	3.21	3.00
Drill rod (from list)	60%	55%	50%

Electric welding wire, New York, ⅛, 8.35c.; ¼, 7.85c.; ⅝ to ½, 7.35c. per lb. *Flat, ⅛@¼-in. thick. †F.o.b. cars.

METALS

Current Prices in Cents Per Pound

Copper, electrolytic (up to carlots), New York	14.87½		
Tin, 5-ton lots, New York	71.00		
Lead (up to carlots) E. St. Louis	7.65	New York	8.37½
Zinc (up to carlots) E. St. Louis	7.05	New York	8.00

	New York	Cleveland	Chicago
Antimony (Chinese), ton spot	15.50	17.50	15.00
Copper sheets, base	22.25	22.00	22.25
Copper wire, base	19.12½	19.25	15.75
Copper bars, base	21.87½	21.87½	21.87½
Copper tubing, base	24.25	24.25	24.25
Brass sheets, high, base	18.62½	18.62½	20.12½
Brass tubing, high, base	23.50	23.50	23.00
Brass rods, high, base	16.37½	16.37½	16.37½
Brass wire, high, base	19.12½	18.87½	19.12½

Shop Materials and Supplies

METALS—Continued

	New York	Cleveland	Chicago
Aluminium ingots, 98 to 99%, 1 to 15 ton lots	27.00	27.00	27.02
Zinc sheets (casks)	13.00	12.80	12.01
Solder (⅛ and ¼), (case lots)	43.00	44.50	38½@42½

Babbitt metal, delivered, New York, cents per lb.:

Genuine, highest grade	90.00
Commercial genuine, intermediate grade	63.00
Anti-friction metal, general service	32 50
No. 4 babbitt (f.o.b.)	14.00

Nickel, f.o.b. refinery, cents per lb.:

Ingots	35.00	Electrolytic	39.00
Shot	36.00		

SPECIAL NICKEL AND ALLOYS—Price in cents per lb., f.o.b. Huntington, W. Va.:

Hot rolled nickel sheet (base)	52.00
Cold rolled nickel sheet (base)	60.00
Hot rolled rods, Grade "A" (base)	50.00
Cold drawn rods, Grade "A" (base)	58.00

Base price of Monel metal in cents per lb., f.o.b. Huntington, W. Va.:

Shot	32.00	Hot rolled rods (base)	35.00
Blocks	32.00	Cold drawn rods (base)	43.00
Cold rolled sheets (base)	50.00	Hot rolled sheets (base)	42.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Crucible heavy copper	11.62½@11.87½	11.00	10.50@11.00
Copper, heavy, and wire	10.87½@11.37½	11.25	10.00@10.50
Copper, light, and bottoms	9.50 @10.00	9.50	8.75@ 9.25
Heavy lead	6.50 @ 7.00	6.50	6.25@ 6 75
Tea lead	4.50 @ 5.00	4.50	5.00@ 5.50
Brass, heavy, yellow	7.00 @ 7.25	7.25	6.25@ 6.75
Brass, heavy, red	9.25 @ 9.75	9.25	8.50@ 9.00
Brass, light	5.50 @ 5.75	6.00	5.75@ 6.25
No. 1 yellow rod turnings	7.75 @ 8.25	7.50	7.25@ 7.75
Zinc	4.25 @ 4.50	4.00	3.50@ 4.50

TIN PLATES—American Charcoal—Bright—Per box

		New York	Cleveland	Chicago
"AAA" Grade:				
IC,	14x20	$12.10	$11.95	$11.50
"A" Grade:				
IC,	14x20	9.70	9.90	9.50
Coke Plates—Primes—Per box				
100-lb.,	14x20	6.45	6.10	7.00
Terne Plates—Small lots, 8-lb. Coating—Per box				
IC,	14x20	7.75@8.00	6.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.13@0.17½	$0.18	$0.15@0 20
Cotton waste, colored, per lb.	.10@ .14	.13½	.12@.17
Wiping cloths, washed white, per lb	.17½	36.00 per M	.15
Sal soda, per 175 lb. keg	2.80	2.75	2.75
Roll sulphur, per lb.	.04	.03½	.04
Linseed oil, per 7½-lb. gal., 5 bbl. lots	.84½	.98	84
Lard cutting oil, 25% lard, per gal.	.55	.50	48
Machine lubricant, medium-bodied (55 gal metal bbl.), per gal.	.35	.35	.29
Belting—Present discounts from list in fair quantities (½ doz. rolls).			
Leather—List price, 24c. per lin. ft per inch of width for single ply.			
Medium grade	40–5%	40–5%	40–5%
Heavy grade	30–10%	30–10%	30–10%
Rubber transmission, 6-in., 6 ply, $1.83 per lin. ft.			
First grade	50%	50–10%	50%
Second grade	50–10%	60–5%	50–10%

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.0324	$0.0324	$0.0324
Cold drawn shafting	per lb.	.04	.04	.04
Brass rods	per lb.	.1637½	.1662½	.1712½
Solder (⅛ and ¼)	per lb.	.43	.4275	.4025
Cotton waste	per lb.	.13@17½	13@.17½	15@22
Washers, cast iron (⅛ in.)	per 100 lb.	7.00	7.00	7.00
Emery disks, cloth, No. 1, 6 in. dia.	per 100	3.10	3.10	3.55
Lard cutting oil	per gal.	.55	.55	.55
Machine oil	per gal.	.35	.35	.35
Belting, leather, medium	off list	40–5%	40–5%	40%
Machine bolts, up to 1x30 in.	off list	40%	40%	40%

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials—In sheets 9x11 in., No. 1 grade, per ream of 480 sheets:			
Flint paper	$5.40	$5.84	$5.13
Emery paper	10.71	11.00	10.71
Emery cloth	27.84	31.12	27.84
Emery disks, 6 in. dia., No. 1 grade, per 100:			
Paper	1.32	1.45	1.32
Cloth	3.10	3.50	3.05
Fire clay, per 100 lb. bag		.75	75
Coke, prompt furnace, per net ton	Connellsville,		3.50
Coke, prompt foundry, per net ton	Connellsville,		5.00@6.25
White lead, dry or in oil,	100 lb. kegs	New York,	15.25
Red lead, dry,	100 lb. kegs	New York,	15.25
Red lead, in oil,	100 lb. kegs	New York,	16 75

SHOP SUPPLIES

Machine bolts, ¼x1½-in., per 100, $1.70. Discount at New York warehouses on all sizes up to 1x30-in., 40%; 1⅛ and 1¼x3-in. up to 12-in., 15%; with cold punched hex. nuts up to 1-in. dia. (plus std. extra of 10%) 30%; with hot pressed hex. nuts up to 1x30-in. (plus std. extra of 10%) 35%.

Carriage bolts, ¼x1½-in., per 100, $1.00. Discount on all sizes up to 1x30-in., 30%.

Coach and lag screws, 1½x$\frac{3}{16}$in., $2.25 per 100, less 40%.

Tap bolts, 1½x½-in., $1.00 per 100. List plus 35% at New York warehouses.

Bolt ends, 1x12-in., 10c. per lb., less 40%.

Nuts, semi-finished, ¼x½-in., 2c. each. Discount 70% for $\frac{3}{16}$-in and smaller and 65% for ⅜-in. and larger.
Case hardened ¼x½-in., 6c. each, less 50%.

Rivets, button heads, ¾-in., ⅞-in., 1-in. diam. x2$\frac{3}{16}$-in. to 4½-in $5.00* per 100 lb. at New York warehouses; cone heads, same sizes, $5.20* per 100 lb. Rivets, $\frac{7}{16}$x1-in. and longer, 19c. per lb., less 50%. Same discount for tinned. EXTRA per 100 lb. for 1⅛ to 2-in. long, all diameters, 25c.; ⅝-in. dia., 35c.; ¾-in. dia., 75c.; 1-in. long and shorter, 75c.; longer than 5-in., 50c.; less than 200 lb. 50c.; countersunk heads, 45c.

Washers, cast iron, ⅛-in., $7.00* per 100 lb. at New York warehouses; ¼-in., $6.00* per 100 lb

*For immediate delivery from warehouse

Machine Requirements and Industrial Construction

Machine Tools and Equipment Wanted

Ill., Chicago—Illinois Steel Co., 208 South La Salle St.—13 in. power saw for South Chicago works.

Me., Portland—Dartmouth Real Estate Trust Co.—miscellaneous tools and equipment for proposed 3 story garage and repair shop on Barter Blvd.

Md., Baltimore—Baltimore & Ohio R.R., W. S. Galloway, Purch. Agt.—drill press and shapers for shops at Martinsburg, W. Va.

Mass., Lowell—Scannell Boiler Works—10 ton electric traveling crane.

Mich., Detroit—Dept. of Public Works, J. E. Mills, Comr. of Purchases and Supplies, City Hall—ten drills and two calyx concrete core drills.

O., Columbus — Packard-Columbia Co., Grant Ave. and Broad St., E. C. Brisley, Pres.—complete machinery and equipment including drill press, milling machine, etc. for proposed service station at 780 North High St.

O., Youngstown — Youngstown Sheet & Tube Co., Stambaugh Bldg.—three overhead electric cranes for Campbell, O., works.

Pa., Bristol—Pacific Steel Boiler Corp.—1,000 lb. electric steel furnace.

Pa., Philadelphia — Pennsylvania R.R. Co., Broad St. Station, S. Porcher, Gen. Purch. Agt.—two large punches and two shears for Altoona Car Shops.

Pa., Pittsburgh—Jones & Laughlin Steel Corp., Third Ave. and Ross St.—13 overhead electric cranes for new seamless tube mill.

Pa., Pittsburgh—The Thomas Co., Fulton Bldg.—plate bending rolls and friction saw.

Tex., San Antonio—Buick Motor Co., 5th St. and Broadway—2 lathes, 2 drill presses, bolt cutter, etc. for proposed 3 story, 80 x 140 ft. garage at Broadway and 10th St.

Wis., Janesville—Schlueter Boiler Works, 320 North Main St.—welding equipment for proposed 1 story, 70 x 90 ft. shop. Estimated cost $40,000.

Wis., South Milwaukee—Sowell Co.—new foundry equipment and core making machinery for 1 story foundry recently destroyed by fire.

Ont., London—Richards Wilcox Canadian Co., W. R. Yendall, Mgr.—complete equipment for the manufacture of hardware for proposed extension to factory. Estimated cost $50,000.

Ont., Walkerville — Chrysler Motor Car Co., Tecumseh Rd., Windsor—complete machinery and equipment for recently acquired factory here. Estimated cost $50,000.

Australia, Melbourne—Victorian Government Railways, will receive bids until Feb. 9, for one nut frazing machine with equipment.

Opportunities for Future Business

Calif., San Francisco—Lacey & Vukicevich, Hearst Bldg., is having plans prepared for the construction of a 4 story garage at Latham Pl. Estimated cost $200,000. O'Brien Bros., 315 Montgomery St., Archts.

Calif., San Jose—Pacific Gas & Electric Co., 245 Market St., San Francisco, awarded contract for the construction of four 1 story shops and garages at Linden and Stockton Sts., here. Estimated cost $62,000. Noted Nov. 25.

Conn., Haddam—Bd. of Selectmen, Town Hall, plans the construction of a school including manual training department, etc. Estimated cost $500,000.

Conn., Hartford—Packard Motor Car Co., 150 Washington St., will soon award contract for the construction of a 2 story, 140 x 148 ft. sales and service station. Estimated cost $125,000. Smith & Bassette, 36 Pearl St., Archts.

Ga., Atlanta—G. Burnett, Ptree. Rd., is having plans prepared for the construction of a 1 story, 122 x 202 ft. garage at James and Spring Sts., A. F. N. Everett, Candler Annex, Archt. S. S. Stover, 101 Marietta Bldg., Engr.

Ill., Chicago—Weidenmiller Die Mfg. Co., E. O. Weidenmiller, Secy., 4311 Lincoln Ave., manufacturers of brass and steel dies, aluminum sugar washer plates, etc., awarded contract for the construction of a 3 story, 46 x 125 ft. factory at 5313 Ravenwood Ave. Estimated cost $45,000.

Ill., Chicago—O. P. Wodack, 23 South Jefferson St., manufacturers of electric drills, awarded contract for the construction of a 1 story, 50 x 120 ft. shop at 4627 West Huron St. Estimated cost $14,000.

Mass., Boston—Kane Furniture Co., 740 Washington St., awarded contract for the construction of a 3 story addition to factory at 208 Camden St. Estimated cost $50,000.

Mass., Brockton — D. W. Mullen, 97 Boylston St., awarded contract for the construction of a 1 story repair and service garage at 159 Main St. Estimated cost $40,000.

Mass., Framingham—West Boston Gas Co., 49 Howard St., awarded contract for the construction of a 1 and 2 story, 85 x 115 ft. garage and repair shop. Estimated cost $50,000. Noted Nov. 4.

Mass., Gloucester—City plans the construction of a 1 story repair and service garage on Rogers St. Estimated cost $50,000. Private plans.

Mass., Holyoke—F. Rainsalt, c/o F. H. Franz, 276 High St., Archt., is having preliminary plans prepared for the construction of a 1 story garage and repair shop on Cabot St. Estimated cost $50,000.

Mass., Malden (Boston P. O.) — L. M. Fowler, 424 Pleasant St., will build a 1 story, 65 x 85 ft. garage and repair shop. Estimated cost $40,000. A. O. Bottomley, 10 Tremont St., Boston, Archt. Noted Oct. 14.

Mass., Quincy Point (mail Boston) — Bethlehem Shipbuilding Corp., Fore River, Quincy, awarded contract for the construction of a 1 story fabricating shop at 97 East Howard St., here. Estimated cost $45,000.

Mass., Somerville (Boston P. O.)—Somerville Machinery & Foundry Co., 14 Kent St., is receiving bids for the construction of a 1 story factory. Estimated cost $40,000. D. Cormier, 15 Herbert St., Archt.

Mich., Detroit—First National Bank, Woodward St. and Cadillac Sq., had plans prepared for the construction of an 18 story garage on Bates St. Estimated cost $350,000. A. Kahn, 1000 Marquette Bldg., Archt.

Mich., Muskegon—Lakey Foundry & Machine Co., Water St., plans to rebuild 1 story factory including core room and stock room. Estimated cost $40,000. M. C. Young, c/o owner, Engr.

Mo., Kansas City—Essmueller Mill Supply Co., 1220 South 8th St., St. Louis, has work under way on the construction of a 50 x 110 ft. machine shop here.

Mo., Kansas City — Interurban Central Station Co., 1135 Scarritt Bldg., is having plans prepared for the construction of a 10 story 130 x 210 ft. service station, garage and office at 10th and Grand Sts. Estimated cost $2,500,000. Wight & Wight, First National Bank Bldg., Archts.

Mo., St. Louis — Marbelite Corp. of America, H. Berkschat, Pres., 3248 Long Beach St., Los Angeles, Calif., manufacturers of lighting standards, telephone poles and pilings, is having preliminary plans prepared for the construction of first unit of six buildings here. Estimated cost $250,000.

N. Y., New York—Columbia Metal Box Co., A. E. Blackman, Pres., 226 East 144th St., is having plans prepared for the construction of a 3 story, 130 x 190 ft. factory and garage at Rider Ave. and 142nd St. Estimated cost $300,000. Noted Dec. 9.

N. Y., Port Jefferson—Standard Oil Co., 26 Broadway, New York, plans the construction of a 1 story, 40 x 150 ft. machine shop here. Estimated cost $40,000.

O., Canton—Luehrs Co., 118 St. Clair Ave., Cleveland, manufacturers conveying machinery, will soon award contract for the construction of a 1 story, 101 x 122 ft. factory, here. Estimated cost $75,000. D. Luehrs, c/o owner, Engr. Noted Dec. 9.

O., Cleveland—Gogan Machine & Foundry Co. Inc., 1630 Collamer Ave., manufacturers of auto spring, bumper and bracket heat treating machines, etc., plans the construction of a factory at 1440 East 55th St.

O., Kent—The Lamson & Session Co., c/o J. Jennings, 2188 Scranton Rd., Cleveland, manufacturers of bolts, rivets and wire rope clips, awarded contract for the construction of a 1 story, 45 x 90 ft. pickling building here. Estimated cost $40,000. Noted Nov. 25.

O., Norwood—The Chevrolet Co., Smith Rd., awarded contract for the construction of a 1 story, 120 x 282 ft. factory. Estimated cost $160,000. Noted Nov. 18.

Pa., Philadelphia—Logan Oakland Motor Co., 4718 North Broad St., awarded contract for the construction of a 3 story, 60 x 178 ft. sales and service station. Noted Oct. 14.

R. I., Auburn—Respro Inc. is receiving bids for the construction of a 1 and 2 story addition to picker building and storehouse. Estimated cost $40,000. C. R. Makepeace & Co., Butler Exchange Bldg., Providence, Archts.

Tenn., Paris — Louisville & Nashville R.R. Co., Louisville, will soon award contract for the construction of a 72 x 120 ft. planing mill at railroad shops here, to replace fire loss. Estimated cost $25,000. W. H. Courtenay, Ch. Engr. Noted Feb. 18.

Tex., Beaumont—Boykin Machinery & Supply Co. c/o B. Boykin, Pres., manufacturers of oil well machinery, has acquired a site and plans the construction of a 1 story, 75 x 200 ft. annex to plant on Laurel St. Estimated cost $150,000. Architect and engineer not selected.

Tex., Brownsville—J. Dennett is having preliminary plans prepared for the construction of a 2 story garage at Adams and 13th Sts. Estimated cost $60,000. Private plans.

Wis., Madison—The Central Garage Co., Webster St., plans the construction of a 1 story, 60 x 200 ft. addition to repair shop and service station. Estimated cost $40,000. Architect not selected.

Wis., Milwaukee — Federal Engineering Co., 440 Milwaukee St., Engr., is receiving bids for the construction of a 1 story, 62 x 90 ft. addition to factory for Bradley Wash Fountain Co., 2203 Sycamore St. Estimated cost $40,000.